



HENK0060.ST25.txt  
SEQUENCE LISTING

<110> Kottwitz, Beatrix  
Breves, Roland  
Maurer, Karl-Heinz

<120> DETERGENT AND CLEANING AGENT WITH HYBRID ALPHA-AMYLASES

<130> HENK-0060 / H4714

<140> US 10/774,018

<141> 2004-02-06

<150> PCT/EP02/08391

<151> 2002-07-27

<150> EP 101 38 753.9

<151> 2001-08-07

<160> 20

<170> PatentIn version 3.3

<210> 1

<211> 1452

<212> DNA

<213> Bacillus licheniformis

<220>

<221> CDS

<222> (1)..(1449)

<400> 1

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| gca | aat | ctt | aat | ggg | acg | ctg | atg | cag | tat | ttt | gaa | tgg | tac | atg | ccc | 48 |
| Ala | Asn | Leu | Asn | Gly | Thr | Leu | Met | Gln | Tyr | Phe | Glu | Trp | Tyr | Met | Pro |    |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |    |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| aat | gac | ggc | caa | cat | tgg | aag | cgc | ttg | caa | aac | gac | tcg | gca | tat | ttg | 96 |
| Asn | Asp | Gly | Gln | His | Trp | Lys | Arg | Leu | Gln | Asn | Asp | Ser | Ala | Tyr | Leu |    |
|     |     | 20  |     |     |     |     |     | 25  |     |     |     |     | 30  |     |     |    |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gct | gaa | cac | ggt | att | act | gcc | gtc | tgg | att | ccc | ccg | gca | tat | aag | gga | 144 |
| Ala | Glu | His | Gly | Ile | Thr | Ala | Val | Trp | Ile | Pro | Pro | Ala | Tyr | Lys | Gly |     |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| acg | agc | caa | gcg | gat | gtg | ggc | tac | ggt | gct | tac | gac | ctt | tat | gat | tta | 192 |
| Thr | Ser | Gln | Ala | Asp | Val | Gly | Tyr | Gly | Ala | Tyr | Asp | Leu | Tyr | Asp | Leu |     |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ggg | gag | ttt | cat | caa | aaa | ggg | acg | gtt | cgg | aca | aag | tac | ggc | aca | aaa | 240 |
| Gly | Glu | Phe | His | Gln | Lys | Gly | Thr | Val | Arg | Thr | Lys | Tyr | Gly | Thr | Lys |     |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gga | gag | ctg | caa | tct | gcg | atc | aaa | agt | ctt | cat | tcc | cgc | gac | att | aac | 288 |
| Gly | Glu | Leu | Gln | Ser | Ala | Ile | Lys | Ser | Leu | His | Ser | Arg | Asp | Ile | Asn |     |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gtt | tac | ggg | gat | gtg | gtc | atc | aac | cac | aaa | ggc | ggc | gct | gat | gcg | acc | 336 |
| Val | Tyr | Gly | Asp | Val | Val | Ile | Asn | His | Lys | Gly | Gly | Ala | Asp | Ala | Thr |     |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gaa | gat | gta | acc | gcg | gtt | gaa | gtc | gat | ccc | gct | gac | cgc | aac | cgc | gta | 384 |
| Glu | Asp | Val | Thr | Ala | Val | Glu | Val | Asp | Pro | Ala | Asp | Arg | Asn | Arg | Val |     |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| att | tca | gga | gaa | cac | cga | att | aaa | gcc | tgg | aca | cat | ttt | cat | ttt | ccg | 432 |
| Ile | Ser | Gly | Glu | His | Arg | Ile | Lys | Ala | Trp | Thr | His | Phe | His | Phe | Pro |     |

## HENK0060.ST25.txt

| 130   | 135 | 140 |      |
|---|-----|-----|------|
| ggg cgc ggc agc aca tac agc gat ttt aaa tgg cat tgg tac cat ttt<br>Gly Arg Gly Ser Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe<br>145 150 155 160 |     |     | 480  |
| gac gga acc gat tgg gac gag tcc cga aag ctg aac cgc atc tat aag<br>Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys<br>165 170 175     |     |     | 528  |
| ttt caa gga aag gct tgg gat tgg gaa gtt tcc aat gaa aac ggc aac<br>Phe Gln Gly Lys Ala Trp Asp Trp Glu Val Ser Asn Glu Asn Gly Asn<br>180 185 190     |     |     | 576  |
| tat gat tat ttg atg tat gcc gac atc gat tat gac cat cct gat gtc<br>Tyr Asp Tyr Leu Met Tyr Ala Asp Ile Asp Tyr Asp His Pro Asp Val<br>195 200 205     |     |     | 624  |
| gca gca gaa att aag aga tgg ggc act tgg tat gcc aat gaa ctg caa<br>Ala Ala Glu Ile Lys Arg Trp Gly Thr Trp Tyr Ala Asn Glu Leu Gln<br>210 215 220     |     |     | 672  |
| ttg gac ggt ttc cgt ctt gat gct gtc aaa cac att aaa ttt tct ttt<br>Leu Asp Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys Phe Ser Phe<br>225 230 235 240 |     |     | 720  |
| ttg cgg gat tgg gtt aat cat gtc agg gaa aaa acg ggg aag gaa atg<br>Leu Arg Asp Trp Val Asn His Val Arg Glu Lys Thr Gly Lys Glu Met<br>245 250 255     |     |     | 768  |
| ttt acg gta gct gaa tat tgg cag aat gac ttg ggc gcg ctg gaa aac<br>Phe Thr Val Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn<br>260 265 270     |     |     | 816  |
| tat ttg aac aaa aca aat ttt aat cat tca gtg ttt gac gtg ccg ctt<br>Tyr Leu Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu<br>275 280 285     |     |     | 864  |
| cat tat cag ttc cat gct gca tcg aca cag gga ggc ggc tat gat atg<br>His Tyr Gln Phe His Ala Ala Ser Thr Gln Gly Gly Gly Tyr Asp Met<br>290 295 300     |     |     | 912  |
| agg aaa ttg ctg aac agt acg gtc gtt tcc aag cat ccg ttg aaa gcg<br>Arg Lys Leu Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala<br>305 310 315 320 |     |     | 960  |
| gtt aca ttt gtc gat aac cat gat aca cag ccg ggg caa tcg ctt gag<br>Val Thr Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu<br>325 330 335     |     |     | 1008 |
| tcg act gtc caa aca tgg ttt aag ccg ctt gct tac gct ttt att ctc<br>Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu<br>340 345 350     |     |     | 1056 |
| aca agg gaa tct gga tac cct cag gtt ttc tac ggg gat atg tac ggg<br>Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly<br>355 360 365     |     |     | 1104 |
| acg aaa gga gac tcc cag cgc gaa att cct gcc ttg aaa cac aaa att<br>Thr Lys Gly Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile<br>370 375 380     |     |     | 1152 |
| gaa ccg atc tta aaa gcg aga aaa cag tat gcg tac gga gca cag cat<br>Glu Pro Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His<br>385 390 400     |     |     | 1200 |
| gat tat ttc gac cac cat gac att gtc ggc tgg aca agg gaa ggc gac<br>Asp Tyr Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp<br>1248            |     |     |      |

HENK0060.ST25.txt

| 405   | 410 | 415         |      |
|---|-----|-------------|------|
| agc tcg gtt gca aat tca ggt ttg gcg gca tta ata aca gac gga ccc |     |             | 1296 |
| Ser Ser Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro | 420 | 425 430     |      |
| ggt ggg gca aag cga atg tat gtc ggc cgg caa aac gcc ggt gag aca |     |             | 1344 |
| Gly Gly Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr | 435 | 440 445     |      |
| tgg cat gac att acc gga aac cgt tgc gag ccg gtt gtc atc aat tcg |     |             | 1392 |
| Trp His Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser | 450 | 455 460     |      |
| gaa ggc tgg gga gag ttt cac gta aac ggc ggg tcg gtt tca att tat |     |             | 1440 |
| Glu Gly Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr | 465 | 470 475 480 |      |
| ggt caa aga tag   |     |             | 1452 |
| Val Gln Arg   |     |             |      |

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 <212> PRT  
 <213> Bacillus licheniformis

<400> 2

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| Asn Asp Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ser Ala Tyr Leu | 20  | 25  | 30  |     |
| Ala Glu His Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly | 35  | 40  | 45  |     |
| Thr Ser Gln Ala Asp Val Gly Tyr Gly Ala Tyr Asp Leu Tyr Asp Leu | 50  | 55  | 60  |     |
| Gly Glu Phe His Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys | 65  | 70  | 75  | 80  |
| Gly Glu Leu Gln Ser Ala Ile Lys Ser Leu His Ser Arg Asp Ile Asn | 85  | 90  | 95  |     |
| Val Tyr Gly Asp Val Val Ile Asn His Lys Gly Gly Ala Asp Ala Thr | 100 | 105 | 110 |     |
| Glu Asp Val Thr Ala Val Glu Val Asp Pro Ala Asp Arg Asn Arg Val | 115 | 120 | 125 |     |
| Ile Ser Gly Glu His Arg Ile Lys Ala Trp Thr His Phe His Phe Pro | 130 | 135 | 140 |     |
| Gly Arg Gly Ser Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe | 145 | 150 | 155 | 160 |

HENK0060.ST25.txt

Asp Gly Thr Asp Trp<sub>165</sub> Asp Glu Ser Arg Lys<sub>170</sub> Leu Asn Arg Ile Tyr<sub>175</sub> Lys  
 Phe Gln Gly Lys<sub>180</sub> Ala Trp Asp Trp Glu<sub>185</sub> Val Ser Asn Glu<sub>190</sub> Asn Gly Asn  
 Tyr Asp Tyr<sub>195</sub> Leu Met Tyr Ala Asp<sub>200</sub> Ile Asp Tyr Asp His<sub>205</sub> Pro Asp Val  
 Ala Ala<sub>210</sub> Glu Ile Lys Arg Trp<sub>215</sub> Gly Thr Trp Tyr Ala<sub>220</sub> Asn Glu Leu Gln  
 Leu<sub>225</sub> Asp Gly Phe Arg Leu<sub>230</sub> Asp Ala Val Lys His<sub>235</sub> Ile Lys Phe Ser Phe<sub>240</sub>  
 Leu Arg Asp Trp Val<sub>245</sub> Asn His Val Arg Glu<sub>250</sub> Lys Thr Gly Lys Glu<sub>255</sub> Met  
 Phe Thr Val Ala<sub>260</sub> Glu Tyr Trp Gln Asn<sub>265</sub> Asp Leu Gly Ala Leu<sub>270</sub> Glu Asn  
 Tyr Leu Asn<sub>275</sub> Lys Thr Asn Phe Asn<sub>280</sub> His Ser Val Phe Asp<sub>285</sub> Val Pro Leu  
 His Tyr<sub>290</sub> Gln Phe His Ala Ala<sub>295</sub> Ser Thr Gln Gly Gly<sub>300</sub> Gly Tyr Asp Met  
 Arg<sub>305</sub> Lys Leu Leu Asn Ser<sub>310</sub> Thr Val Val Ser Lys<sub>315</sub> His Pro Leu Lys Ala<sub>320</sub>  
 Val Thr Phe Val Asp<sub>325</sub> Asn His Asp Thr Gln<sub>330</sub> Pro Gly Gln Ser Leu<sub>335</sub> Glu  
 Ser Thr Val Gln<sub>340</sub> Thr Trp Phe Lys Pro<sub>345</sub> Leu Ala Tyr Ala Phe<sub>350</sub> Ile Leu  
 Thr Arg Glu<sub>355</sub> Ser Gly Tyr Pro Gln<sub>360</sub> Val Phe Tyr Gly Asp<sub>365</sub> Met Tyr Gly  
 Thr Lys<sub>370</sub> Gly Asp Ser Gln Arg<sub>375</sub> Glu Ile Pro Ala Leu<sub>380</sub> Lys His Lys Ile  
 Glu<sub>385</sub> Pro Ile Leu Lys Ala<sub>390</sub> Arg Lys Gln Tyr Ala<sub>395</sub> Tyr Gly Ala Gln His<sub>400</sub>  
 Asp Tyr Phe Asp His<sub>405</sub> His Asp Ile Val Gly<sub>410</sub> Trp Thr Arg Glu Gly<sub>415</sub> Asp  
 Ser Ser Val Ala<sub>420</sub> Asn Ser Gly Leu Ala<sub>425</sub> Ala Leu Ile Thr Asp<sub>430</sub> Gly Pro

HENK0060.ST25.txt

Gly Gly Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr  
435 440 445

Trp His Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser  
450 455 460

Glu Gly Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr  
465 470 475 480

Val Gln Arg

<210> 3  
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<212> DNA  
<213> Bacillus amyloliquefaciens

<220>  
<221> CDS  
<222> (1)..(1449)

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1 5 10 15  
ggc cag cat tgg aaa cga ttg cag aat gat gcg gaa cat tta tcg gat 96  
Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp  
20 25 30  
atc gga atc act gcc gtc tgg att cct ccc gca tac aaa gga ttg agc 144  
Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Leu Ser  
35 40 45  
caa tcc gat aac gga tac gga cct tat gat ttg tat gat tta gga gaa 192  
Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu  
50 55 60  
ttc cag caa aaa ggg acg gtc aga acg aaa tac ggc aca aaa tca gag 240  
Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Ser Glu  
65 70 75 80  
ctt caa gat gcg atc ggc tca ctg cat tcc cgg aac gtc caa gta tac 288  
Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln Val Tyr  
85 90 95  
gga gat gtg gtt ttg aat cat aag gct ggt gct gat gca aca gaa gat 336  
Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr Glu Asp  
100 105 110  
gta act gcc gtc gaa gtc aat ccg gcc aat aga aat cag gaa act tcg 384  
Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu Thr Ser  
115 120 125  
gag gaa tat caa atc aaa gcg tgg acg gat ttt cgt ttt ccg ggc cgt 432  
Glu Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro Gly Arg  
130 135 140  
gga aac acg tac agt gat ttt aaa tgg cat tgg tat cat ttc gac gga 480  
Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly  
145 150 155 160

HENK0060.ST25.txt

|   |      |
|---|------|
| gcg gac tgg gat gaa tcc cgg aag atc agc cgc atc ttt aag ttt cgt<br>Ala Asp Trp Asp Glu Ser Arg Lys Ile Ser Arg Ile Phe Lys Phe Arg<br>165 170 175     | 528  |
| ggg gaa gga aaa gcg tgg gat tgg gaa gta tca agt gaa aac ggc aac<br>Gly Glu Gly Lys Ala Trp Asp Trp Glu Val Ser Ser Glu Asn Gly Asn<br>180 185 190     | 576  |
| tat gac tat tta atg tat gct gat gtt gac tac gac cac cct gat gtc<br>Tyr Asp Tyr Leu Met Tyr Ala Asp Val Asp Tyr Asp His Pro Asp Val<br>195 200 205     | 624  |
| gtg gca gag aca aaa aaa tgg ggt atc tgg tat gcg aat gaa ctg tca<br>Val Ala Glu Thr Lys Lys Trp Gly Ile Trp Tyr Ala Asn Glu Leu Ser<br>210 215 220     | 672  |
| tta gac ggc ttc cgt att gat gcc gcc aaa cat att aaa ttt tca ttt<br>Leu Asp Gly Phe Arg Ile Asp Ala Ala Lys His Ile Lys Phe Ser Phe<br>225 230 235 240 | 720  |
| ctg cgt gat tgg gtt cag gcg gtc aga cag gcg acg gga aaa gaa atg<br>Leu Arg Asp Trp Val Gln Ala Val Arg Gln Ala Thr Gly Lys Glu Met<br>245 250 255     | 768  |
| ttt acg gtt gcg gag tat tgg cag aat aat gcc ggg aaa ctc gaa aac<br>Phe Thr Val Ala Glu Tyr Trp Gln Asn Asn Ala Gly Lys Leu Glu Asn<br>260 265 270     | 816  |
| tac ttg aat aaa aca agc ttt aat caa tcc gtg ttt gat gtt ccg ctt<br>Tyr Leu Asn Lys Thr Ser Phe Asn Gln Ser Val Phe Asp Val Pro Leu<br>275 280 285     | 864  |
| cat ttc aat tta cag gcg gct tcc tca caa gga ggc gga tat gat atg<br>His Phe Asn Leu Gln Ala Ala Ser Ser Gln Gly Gly Gly Tyr Asp Met<br>290 295 300     | 912  |
| agg cgt ttg ctg gac ggt acc gtt gtg tcc agg cat ccg gaa aag gcg<br>Arg Arg Leu Leu Asp Gly Thr Val Val Ser Arg His Pro Glu Lys Ala<br>305 310 315 320 | 960  |
| gtt aca ttt gtt gaa aat cat gac aca cag ccg gga cag tca ttg gaa<br>Val Thr Phe Val Glu Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu<br>325 330 335     | 1008 |
| tcg aca gtc caa act tgg ttt aaa ccg ctt gca tac gcc ttt att ttg<br>Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu<br>340 345 350     | 1056 |
| aca aga gaa tcc ggt tat cct cag gtg ttc tat ggg gat atg tac ggg<br>Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly<br>355 360 365     | 1104 |
| aca aaa ggg aca tcg cca aag gaa att ccc tca ctg aaa gat aat ata<br>Thr Lys Gly Thr Ser Pro Lys Glu Ile Pro Ser Leu Lys Asp Asn Ile<br>370 375 380     | 1152 |
| gag ccg att tta aaa gcg cgt aag gag tac gca tac ggg ccc cag cac<br>Glu Pro Ile Leu Lys Ala Arg Lys Glu Tyr Ala Tyr Gly Pro Gln His<br>385 390 400     | 1200 |
| gat tat att gac cac ccg gat gtg atc gga tgg acg agg gaa ggt gac<br>Asp Tyr Ile Asp His Pro Asp Val Ile Gly Trp Thr Arg Glu Gly Asp<br>405 410 415     | 1248 |
| agc tcc gcc gcc aaa tca ggt ttg gcc gct tta atc acg gac gga ccc<br>Ser Ser Ala Ala Lys Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro<br>420 425 430     | 1296 |

HENK0060.ST25.txt

|   |             |
|---|-------------|
| ggc gga tca aag cgg atg tat gcc ggc ctg aaa aat gcc ggc gag aca | 1344        |
| Gly Gly Ser Lys Arg Met Tyr Ala Gly Leu Lys Asn Ala Gly Glu Thr |             |
| 435   | 440 445     |
| tggtatgacataacggcgaacggttca gat act gta aaa atc gga tct         | 1392        |
| Trp Tyr Asp Ile Thr Gly Asn Arg Ser Asp Thr Val Lys Ile Gly Ser |             |
| 450   | 455 460     |
| gacggctggggaagagtttcatgtaaacgatgggtccgtctccatttat               | 1440        |
| Asp Gly Trp Gly Glu Phe His Val Asn Asp Gly Ser Val Ser Ile Tyr |             |
| 465   | 470 475 480 |
| gttcagaaataa  | 1452        |
| Val Gln Lys   |             |

<210> 4  
 <211> 483  
 <212> PRT  
 <213> Bacillus amyloliquefaciens

<400> 4

|   |  |
|---|--|
| Val Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Thr Pro Asn Asp |  |
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| Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp |  |
| 20 25 30  |  |
| Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Leu Ser |  |
| 35 40 45  |  |
| Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu |  |
| 50 55 60  |  |
| Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Ser Glu |  |
| 65 70 75 80   |  |
| Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln Val Tyr |  |
| 85 90 95  |  |
| Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr Glu Asp |  |
| 100 105 110   |  |
| Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu Thr Ser |  |
| 115 120 125   |  |
| Glu Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro Gly Arg |  |
| 130 135 140   |  |
| Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly |  |
| 145 150 155 160   |  |
| Ala Asp Trp Asp Glu Ser Arg Lys Ile Ser Arg Ile Phe Lys Phe Arg |  |
| 165 170 175   |  |

HENK0060.ST25.txt

Gly Glu Gly Lys Ala Trp Asp Trp Glu Val Ser Ser Glu Asn Gly Asn  
 180 185 190  
 Tyr Asp Tyr Leu Met Tyr Ala Asp Val Asp Tyr Asp His Pro Asp Val  
 195 200 205  
 Val Ala Glu Thr Lys Lys Trp Gly Ile Trp Tyr Ala Asn Glu Leu Ser  
 210 215 220  
 Leu Asp Gly Phe Arg Ile Asp Ala Ala Lys His Ile Lys Phe Ser Phe  
 225 230 235 240  
 Leu Arg Asp Trp Val Gln Ala Val Arg Gln Ala Thr Gly Lys Glu Met  
 245 250 255  
 Phe Thr Val Ala Glu Tyr Trp Gln Asn Asn Ala Gly Lys Leu Glu Asn  
 260 265 270  
 Tyr Leu Asn Lys Thr Ser Phe Asn Gln Ser Val Phe Asp Val Pro Leu  
 275 280 285  
 His Phe Asn Leu Gln Ala Ala Ser Ser Gln Gly Gly Gly Tyr Asp Met  
 290 295 300  
 Arg Arg Leu Leu Asp Gly Thr Val Val Ser Arg His Pro Glu Lys Ala  
 305 310 315 320  
 Val Thr Phe Val Glu Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu  
 325 330 335  
 Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu  
 340 345 350  
 Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly  
 355 360 365  
 Thr Lys Gly Thr Ser Pro Lys Glu Ile Pro Ser Leu Lys Asp Asn Ile  
 370 375 380  
 Glu Pro Ile Leu Lys Ala Arg Lys Glu Tyr Ala Tyr Gly Pro Gln His  
 385 390 395 400  
 Asp Tyr Ile Asp His Pro Asp Val Ile Gly Trp Thr Arg Glu Gly Asp  
 405 410 415  
 Ser Ser Ala Ala Lys Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro  
 420 425 430  
 Gly Gly Ser Lys Arg Met Tyr Ala Gly Leu Lys Asn Ala Gly Glu Thr  
 435 440 445



HENK0060.ST25.txt

Trp Tyr Asp Ile Thr Gly Asn Arg Ser Asp Thr Val Lys Ile Gly Ser  
450 455 460

Asp Gly Trp Gly Glu Phe His Val Asn Asp Gly Ser Val Ser Ile Tyr  
465 470 475 480

Val Gln Lys

<210> 5  
<211> 1446  
<212> DNA  
<213> Artificial

<220>  
<223> Fusion of Alpha-Amylase-Gene von B. licheniformis and B. amyloliquefaciens (AL34)

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<222> (1)..(1443)

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1 5 10  
ggc cag cat tgg aaa cga ttg cag aat gat gcg gaa cat tta tcg gat 96  
Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp  
20 25 30  
atc ggt att act gcc gtc tgg att ccc ccg gca tat aag gga acg agc 144  
Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Thr Ser  
35 40 45  
caa gcg gat gtg ggc tac ggt gct tac gac ctt tat gat tta ggg gag 192  
Gln Ala Asp Val Gly Tyr Gly Ala Tyr Asp Leu Tyr Asp Leu Gly Glu  
50 55 60  
ttt cat caa aaa ggg acg gtt cgg aca aag tac ggc aca aaa gga gag 240  
Phe His Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Gly Glu  
65 70 75 80  
ctg caa tct gcg atc aaa agt ctt cat tcc cgc gac att aac gtt tac 288  
Leu Gln Ser Ala Ile Lys Ser Leu His Ser Arg Asp Ile Asn Val Tyr  
85 90 95  
ggg gat gtg gtc atc aac cac aaa ggc ggc gct gat gcg acc gaa gat 336  
Gly Asp Val Val Ile Asn His Lys Gly Gly Ala Asp Ala Thr Glu Asp  
100 105 110  
gta acc gcg gtt gaa gtc gat ccc gct gac cgc aac cgc gta att tca 384  
Val Thr Ala Val Glu Val Asp Pro Ala Asp Arg Asn Arg Val Ile Ser  
115 120 125  
gga gaa cac cga att aaa gcc tgg aca cat ttt cat ttt ccg ggg cgc 432  
Gly Glu His Arg Ile Lys Ala Trp Thr His Phe His Phe Pro Gly Arg  
130 135 140  
ggc agc aca tac agc gat ttt aaa tgg cat tgg tac cat ttt gac gga 480  
Gly Ser Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly  
145 150 155 160

## HENK0060.ST25.txt

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| acc | gat | tgg | gac | gag | tcc | cga | aag | ctg | aac | cgc | atc | tat | aag | ttt | caa | 528  |
| Thr | Asp | Trp | Asp | Glu | Ser | Arg | Lys | Leu | Asn | Arg | Ile | Tyr | Lys | Phe | Gln |      |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |      |
| gga | aag | gct | tgg | gat | tgg | gaa | gtt | tcc | aat | gaa | aac | ggc | aac | tat | gat | 576  |
| Gly | Lys | Ala | Trp | Asp | Trp | Glu | Val | Ser | Asn | Glu | Asn | Gly | Asn | Tyr | Asp |      |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |      |
| tat | ttg | atg | tat | gcc | gac | atc | gat | tat | gac | cat | cct | gat | gtc | gca | gca | 624  |
| Tyr | Leu | Met | Tyr | Ala | Asp | Ile | Asp | Tyr | Asp | His | Pro | Asp | Val | Ala | Ala |      |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |      |
| gaa | att | aag | aga | tgg | ggc | act | tgg | tat | gcc | aat | gaa | ctg | caa | ttg | gac | 672  |
| Glu | Ile | Lys | Arg | Trp | Gly | Thr | Trp | Tyr | Ala | Asn | Glu | Leu | Gln | Leu | Asp |      |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |      |
| ggt | ttc | cgt | ctt | gat | gct | gtc | aaa | cac | att | aaa | ttt | tct | ttt | ttg | cgg | 720  |
| Gly | Phe | Arg | Leu | Asp | Ala | Val | Lys | His | Ile | Lys | Phe | Ser | Phe | Leu | Arg |      |
|     | 225 |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |      |
| gat | tgg | gtt | aat | cat | gtc | agg | gaa | aaa | acg | ggg | aag | gaa | atg | ttt | acg | 768  |
| Asp | Trp | Val | Asn | His | Val | Arg | Glu | Lys | Thr | Gly | Lys | Glu | Met | Phe | Thr |      |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |      |
| gta | gct | gaa | tat | tgg | cag | aat | gac | ttg | ggc | gcg | ctg | gaa | aac | tat | ttg | 816  |
| Val | Ala | Glu | Tyr | Trp | Gln | Asn | Asp | Leu | Gly | Ala | Leu | Glu | Asn | Tyr | Leu |      |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |      |
| aac | aaa | aca | aat | ttt | aat | cat | tca | gtg | ttt | gac | gtg | ccg | ctt | cat | tat | 864  |
| Asn | Lys | Thr | Asn | Phe | Asn | His | Ser | Val | Phe | Asp | Val | Pro | Leu | His | Tyr |      |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |      |
| cag | ttc | cat | gct | gca | tcg | aca | cag | gga | ggc | ggc | tat | gat | atg | agg | aaa | 912  |
| Gln | Phe | His | Ala | Ala | Ser | Thr | Gln | Gly | Gly | Gly | Tyr | Asp | Met | Arg | Lys |      |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |      |
| ttg | ctg | aac | agt | acg | gtc | gtt | tcc | aag | cat | ccg | ttg | aaa | gcg | gtt | aca | 960  |
| Leu | Leu | Asn | Ser | Thr | Val | Val | Ser | Lys | His | Pro | Leu | Lys | Ala | Val | Thr |      |
|     | 305 |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |      |
| ttt | gtc | gat | aac | cat | gat | aca | cag | ccg | ggg | caa | tcg | ctt | gag | tcg | act | 1008 |
| Phe | Val | Asp | Asn | His | Asp | Thr | Gln | Pro | Gly | Gln | Ser | Leu | Glu | Ser | Thr |      |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |      |
| gtc | caa | aca | tgg | ttt | aag | ccg | ctt | gct | tac | gct | ttt | att | ctc | aca | agg | 1056 |
| Val | Gln | Thr | Trp | Phe | Lys | Pro | Leu | Ala | Tyr | Ala | Phe | Ile | Leu | Thr | Arg |      |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |      |
| gaa | tct | gga | tac | cct | cag | gtt | ttc | tac | ggg | gat | atg | tac | ggg | acg | aaa | 1104 |
| Glu | Ser | Gly | Tyr | Pro | Gln | Val | Phe | Tyr | Gly | Asp | Met | Tyr | Gly | Thr | Lys |      |
|     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |      |
| gga | gac | tcc | cag | cgc | gaa | att | cct | gcc | ttg | aaa | cac | aaa | att | gaa | ccg | 1152 |
| Gly | Asp | Ser | Gln | Arg | Glu | Ile | Pro | Ala | Leu | Lys | His | Lys | Ile | Glu | Pro |      |
|     |     |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |      |
| atc | tta | aaa | gcg | aga | aaa | cag | tat | gcg | tac | gga | gca | cag | cat | gat | tat | 1200 |
| Ile | Leu | Lys | Ala | Arg | Lys | Gln | Tyr | Ala | Tyr | Gly | Ala | Gln | His | Asp | Tyr |      |
|     |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |      |
| ttc | gac | cac | cat | gac | att | gtc | ggc | tgg | aca | agg | gaa | ggc | gac | agc | tcg | 1248 |
| Phe | Asp | His | His | Asp | Ile | Val | Gly | Trp | Thr | Arg | Glu | Gly | Asp | Ser | Ser |      |
|     |     |     |     | 405 |     |     |     |     | 410 |     |     |     |     | 415 |     |      |
| gtt | gca | aat | tca | ggt | ttg | gcg | gca | tta | ata | aca | gac | gga | ccc | ggt | ggg | 1296 |
| Val | Ala | Asn | Ser | Gly | Leu | Ala | Ala | Leu | Ile | Thr | Asp | Gly | Pro | Gly | Gly |      |
|     |     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |     |      |

HENK0060.ST25.txt

|   |                                 |      |
|---|---------------------------------|------|
| gca aag cga atg tat gtc ggc cgg                                 | caa aac gcc ggt gag aca tgg cat | 1344 |
| Ala Lys Arg Met Tyr Val Gly Arg                                 | Gln Asn Ala Gly Glu Thr Trp His |      |
| 435   | 440 445                         |      |
| gac att acc gga aac cgt tcg gag ccg gtt gtc atc aat tcg gaa ggc | 1392                            |      |
| Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser Glu Gly |                                 |      |
| 450   | 455 460                         |      |
| tgg gga gag ttt cac gta aac ggc ggg tcg gtt tca att tat gtt caa | 1440                            |      |
| Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr Val Gln |                                 |      |
| 465   | 470 475 480                     |      |
| aga tag   | 1446                            |      |
| Arg   |                                 |      |

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 <213> Artificial

<220>  
 <223> Synthetic Construct

<400> 6

|   |
|---|
| Val Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Thr Pro Asn Asp |
| 1 5 10 15   |

|   |
|---|
| Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp |
| 20 25 30  |

|   |
|---|
| Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Thr Ser |
| 35 40 45  |

|   |
|---|
| Gln Ala Asp Val Gly Tyr Gly Ala Tyr Asp Leu Tyr Asp Leu Gly Glu |
| 50 55 60  |

|   |
|---|
| Phe His Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Gly Glu |
| 65 70 75 80   |

|   |
|---|
| Leu Gln Ser Ala Ile Lys Ser Leu His Ser Arg Asp Ile Asn Val Tyr |
| 85 90 95  |

|   |
|---|
| Gly Asp Val Val Ile Asn His Lys Gly Gly Ala Asp Ala Thr Glu Asp |
| 100 105 110   |

|   |
|---|
| Val Thr Ala Val Glu Val Asp Pro Ala Asp Arg Asn Arg Val Ile Ser |
| 115 120 125   |

|   |
|---|
| Gly Glu His Arg Ile Lys Ala Trp Thr His Phe His Phe Pro Gly Arg |
| 130 135 140   |

|   |
|---|
| Gly Ser Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly |
| 145 150 155 160   |

|   |
|---|
| Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys Phe Gln |
|---|

165

170

175

Gly Lys Ala Trp Asp Trp Glu Val Ser Asn Glu Asn Gly Asn Tyr Asp  
 180 185 190

Tyr Leu Met Tyr Ala Asp Ile Asp Tyr Asp His Pro Asp Val Ala Ala  
 195 200 205

Glu Ile Lys Arg Trp Gly Thr Trp Tyr Ala Asn Glu Leu Gln Leu Asp  
 210 215 220

Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys Phe Ser Phe Leu Arg  
 225 230 235 240

Asp Trp Val Asn His Val Arg Glu Lys Thr Gly Lys Glu Met Phe Thr  
 245 250 255

Val Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn Tyr Leu  
 260 265 270

Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu His Tyr  
 275 280 285

Gln Phe His Ala Ala Ser Thr Gln Gly Gly Gly Tyr Asp Met Arg Lys  
 290 295 300

Leu Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala Val Thr  
 305 310 315 320

Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu Ser Thr  
 325 330 335

Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu Thr Arg  
 340 345 350

Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly Thr Lys  
 355 360 365

Gly Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile Glu Pro  
 370 375 380

Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His Asp Tyr  
 385 390 395 400

Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp Ser Ser  
 405 410 415

Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro Gly Gly  
 420 425 430

Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr Trp His  
 Page 12

435

440

445

Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser Glu Gly  
 450 455 460

Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr Val Gln  
 465 470 475 480

Arg

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 <211> 1446  
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 <213> Artificial

<220>  
 <223> Fusion of Alpha-Amylase-Gene von B. licheniformis and B.  
 amyloliquefaciens (AL76)

<220>  
 <221> CDS  
 <222> (1)..(1443)

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 1 5 10 15  
 ggc cag cat tgg aaa cga ttg cag aat gat gcg gaa cat tta tcg gat 96  
 Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp  
 20 25 30  
 atc gga atc act gcc gtc tgg att cct ccc gca tac aaa gga ttg agc 144  
 Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Leu Ser  
 35 40 45  
 caa tcc gat aac gga tac gga cct tat gat ttg tat gat tta gga gaa 192  
 Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu  
 50 55 60  
 ttc cag caa aaa ggg acg gtc aga acg aaa tac ggc aca aaa gga gag 240  
 Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Gly Glu  
 65 70 75 80  
 ctg caa tct gcg atc aaa agt ctt cat tcc cgc gac att aac gtt tac 288  
 Leu Gln Ser Ala Ile Lys Ser Leu His Ser Arg Asp Ile Asn Val Tyr  
 85 90 95  
 ggg gat gtg gtc atc aac cac aaa ggc ggc gct gat gcg acc gaa gat 336  
 Gly Asp Val Val Ile Asn His Lys Gly Gly Ala Asp Ala Thr Glu Asp  
 100 105 110  
 gta acc gcg gtt gaa gtc gat ccc gct gac cgc aac cgc gta att tca 384  
 Val Thr Ala Val Glu Val Asp Pro Ala Asp Arg Asn Arg Val Ile Ser  
 115 120 125  
 gga gaa cac cga att aaa gcc tgg aca cat ttt cat ttt ccg ggg cgc 432  
 Gly Glu His Arg Ile Lys Ala Trp Thr His Phe His Phe Pro Gly Arg  
 130 135 140  
 ggc agc aca tac agc gat ttt aaa tgg cat tgg tac cat ttt gac gga 480  
 Gly Ser Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly

## HENK0060.ST25.txt

| 145   |   | 150  |  | 155 |  | 160 |  |
|---|---|------|--|-----|--|-----|--|
| acc gat tgg gac gag tcc cga aag ctg aac cgc atc tat aag ttt caa | Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys Phe Gln | 528  |  |     |  |     |  |
| gga aag gct tgg gat tgg gaa gtt tcc aat gaa aac ggc aac tat gat | Gly Lys Ala Trp Asp Trp Glu Val Ser Asn Glu Asn Gly Asn Tyr Asp | 576  |  |     |  |     |  |
| tat ttg atg tat gcc gac atc gat tat gac cat cct gat gtc gca gca | Tyr Leu Met Tyr Ala Asp Ile Asp Tyr Asp His Pro Asp Val Ala Ala | 624  |  |     |  |     |  |
| gaa att aag aga tgg ggc act tgg tat gcc aat gaa ctg caa ttg gac | Glu Ile Lys Arg Trp Gly Thr Trp Tyr Ala Asn Glu Leu Gln Leu Asp | 672  |  |     |  |     |  |
| ggt ttc cgt ctt gat gct gtc aaa cac att aaa ttt tct ttt ttg cg  | Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys Phe Ser Phe Leu Arg | 720  |  |     |  |     |  |
| gat tgg gtt aat cat gtc agg gaa aaa acg ggg aag gaa atg ttt acg | Asp Trp Val Asn His Val Arg Glu Lys Thr Gly Lys Glu Met Phe Thr | 768  |  |     |  |     |  |
| gta gct gaa tat tgg cag aat gac ttg ggc gcg ctg gaa aac tat ttg | Val Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn Tyr Leu | 816  |  |     |  |     |  |
| aac aaa aca aat ttt aat cat tca gtg ttt gac gtg ccg ctt cat tat | Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu His Tyr | 864  |  |     |  |     |  |
| cag ttc cat gct gca tcg aca cag gga ggc ggc tat gat atg agg aaa | Gln Phe His Ala Ala Ser Thr Gln Gly Gly Tyr Asp Met Arg Lys     | 912  |  |     |  |     |  |
| ttg ctg aac agt acg gtc gtt tcc aag cat ccg ttg aaa gcg gtt aca | Leu Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala Val Thr | 960  |  |     |  |     |  |
| ttt gtc gat aac cat gat aca cag ccg ggg caa tcg ctt gag tcg act | Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu Ser Thr | 1008 |  |     |  |     |  |
| gtc caa aca tgg ttt aag ccg ctt gct tac gct ttt att ctc aca agg | Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu Thr Arg | 1056 |  |     |  |     |  |
| gaa tct gga tac cct cag gtt ttc tac ggg gat atg tac ggg acg aaa | Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly Thr Lys | 1104 |  |     |  |     |  |
| gga gac tcc cag cgc gaa att cct gcc ttg aaa cac aaa att gaa ccg | Gly Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile Glu Pro | 1152 |  |     |  |     |  |
| atc tta aaa gcg aga aaa cag tat gcg tac gga gca cag cat gat tat | Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His Asp Tyr | 1200 |  |     |  |     |  |
| ttc gac cac cat gac att gtc ggc tgg aca agg gaa ggc gac agc tcg | Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp Ser Ser | 1248 |  |     |  |     |  |
| gtt gca aat tca ggt ttg gcg gca tta ata aca gac gga ccc ggt ggg | Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro Gly Gly | 1296 |  |     |  |     |  |

HENK0060.ST25.txt

| 420   | 425 | 430 |      |
|---|-----|-----|------|
| gca aag cga atg tat gtc ggc cgg caa aac gcc ggt gag aca tgg cat |     |     | 1344 |
| Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr Trp His |     |     |      |
| 435   | 440 | 445 |      |
| gac att acc gga aac cgt tcg gag ccg gtt gtc atc aat tcg gaa ggc |     |     | 1392 |
| Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser Glu Gly |     |     |      |
| 450   | 455 | 460 |      |
| tgg gga gag ttt cac gta aac ggc ggg tcg gtt tca att tat gtt caa |     |     | 1440 |
| Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr Val Gln |     |     |      |
| 465   | 470 | 475 | 480  |
| aga tag   |     |     | 1446 |
| Arg   |     |     |      |

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 <212> PRT  
 <213> Artificial

<220>  
 <223> Synthetic Construct

<400> 8

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|---|--|
| Val Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Thr Pro Asn Asp |  |
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| Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp |  |
| 20 25 30  |  |
| Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Leu Ser |  |
| 35 40 45  |  |
| Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu |  |
| 50 55 60  |  |
| Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Gly Glu |  |
| 65 70 75 80   |  |
| Leu Gln Ser Ala Ile Lys Ser Leu His Ser Arg Asp Ile Asn Val Tyr |  |
| 85 90 95  |  |
| Gly Asp Val Val Ile Asn His Lys Gly Gly Ala Asp Ala Thr Glu Asp |  |
| 100 105 110   |  |
| Val Thr Ala Val Glu Val Asp Pro Ala Asp Arg Asn Arg Val Ile Ser |  |
| 115 120 125   |  |
| Gly Glu His Arg Ile Lys Ala Trp Thr His Phe His Phe Pro Gly Arg |  |
| 130 135 140   |  |
| Gly Ser Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly |  |
| 145 150 155 160   |  |

HENK0060.ST25.txt

Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys Phe Gln  
 165 170 175  
 Gly Lys Ala Trp Asp Trp Glu Val Ser Asn Glu Asn Gly Asn Tyr Asp  
 180 185 190  
 Tyr Leu Met Tyr Ala Asp Ile Asp Tyr Asp His Pro Asp Val Ala Ala  
 195 200 205  
 Glu Ile Lys Arg Trp Gly Thr Trp Tyr Ala Asn Glu Leu Gln Leu Asp  
 210 215 220  
 Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys Phe Ser Phe Leu Arg  
 225 230 235 240  
 Asp Trp Val Asn His Val Arg Glu Lys Thr Gly Lys Glu Met Phe Thr  
 245 250 255  
 Val Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn Tyr Leu  
 260 265 270  
 Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu His Tyr  
 275 280 285  
 Gln Phe His Ala Ala Ser Thr Gln Gly Gly Gly Tyr Asp Met Arg Lys  
 290 295 300  
 Leu Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala Val Thr  
 305 310 315 320  
 Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu Ser Thr  
 325 330 335  
 Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu Thr Arg  
 340 345 350  
 Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly Thr Lys  
 355 360 365  
 Gly Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile Glu Pro  
 370 375 380  
 Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His Asp Tyr  
 385 390 395 400  
 Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp Ser Ser  
 405 410 415  
 Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro Gly Gly  
 420 425 430



HENK0060.ST25.txt

Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr Trp His  
435 440 445

Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser Glu Gly  
450 455 460

Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr Val Gln  
465 470 475 480

Arg

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<211> 1446  
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<213> Artificial

<220>  
<223> Fusion of Alpha-Amylase-Gene von B. licheniformis and B. amyloliquefaciens (AL112)

<220>  
<221> CDS  
<222> (1)..(1443)

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1 5 10 15  
ggc cag cat tgg aaa cga ttg cag aat gat gcg gaa cat tta tcg gat 96  
Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp  
20 25 30  
atc gga atc act gcc gtc tgg att cct ccc gca tac aaa gga ttg agc 144  
Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Leu Ser  
35 40 45  
caa tcc gat aac gga tac gga cct tat gat ttg tat gat tta gga gaa 192  
Gln Ser Asp Asn Gly Tyr Gln Pro Tyr Asp Leu Tyr Asp Leu Gly Glu  
50 55 60  
ttc cag caa aaa ggg acg gtc aga acg aaa tac ggc aca aaa tca gag 240  
Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Ser Glu  
65 70 75 80  
ctt caa gat gcg atc ggc tca ctg cat tcc cgg aac gtc caa gta tac 288  
Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln Val Tyr  
85 90 95  
gga gat gtg gtt ttg aat cat aag gct ggt gct gat gca aca gaa gat 336  
Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr Glu Asp  
100 105 110  
gta acc gcg gtt gaa gtc gat ccc gct gac cgc aac cgc gta att tca 384  
Val Thr Ala Val Glu Val Asp Pro Ala Asp Arg Asn Arg Val Ile Ser  
115 120 125  
gga gaa cac cga att aaa gcc tgg aca cat ttt cat ttt ccg ggg cgc 432  
Gly Glu His Arg Ile Lys Ala Trp Thr His Phe His Phe Pro Gly Arg  
130 135 140

## HENK0060.ST25.txt

|                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |      |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------|
| ggc<br>Gly<br>145 | agc<br>Ser        | aca<br>Thr        | tac<br>Tyr        | agc<br>Ser        | gat<br>Asp<br>150 | ttt<br>Phe        | aaa<br>Lys        | tg<br>Trp         | cat<br>His        | tg<br>Trp<br>155  | tac<br>Tyr        | cat<br>His        | ttt<br>Phe        | gac<br>Asp        | gga<br>Gly<br>160 | 480  |
| acc<br>Thr        | gat<br>Asp        | tg<br>Trp         | gac<br>Asp        | gag<br>Glu<br>165 | tcc<br>Ser        | cga<br>Arg        | aag<br>Lys        | ctg<br>Leu        | aac<br>Asn<br>170 | cgc<br>Arg        | atc<br>Ile        | tat<br>Tyr        | aag<br>Lys        | ttt<br>Phe<br>175 | caa<br>Gln        | 528  |
| gga<br>Gly        | aag<br>Lys        | gct<br>Ala        | tg<br>Trp<br>180  | gat<br>Asp        | tg<br>Trp         | gaa<br>Glu        | gtt<br>Val        | tcc<br>Ser<br>185 | aat<br>Asn        | gaa<br>Glu        | aac<br>Asn        | ggc<br>Gly        | aac<br>Asn<br>190 | tat<br>Tyr        | gat<br>Asp        | 576  |
| tat<br>Tyr        | ttg<br>Leu        | atg<br>Met<br>195 | tat<br>Tyr        | gcc<br>Ala        | gac<br>Asp        | atc<br>Ile        | gat<br>Asp<br>200 | tat<br>Tyr        | gac<br>Asp        | cat<br>His        | cct<br>Pro        | gat<br>Asp<br>205 | gtc<br>Val        | gca<br>Ala        | gca<br>Ala        | 624  |
| gaa<br>Glu        | att<br>Ile<br>210 | aag<br>Lys        | aga<br>Arg        | tg<br>Trp         | ggc<br>Gly        | act<br>Thr<br>215 | tg<br>Trp         | tat<br>Tyr        | gcc<br>Ala        | aat<br>Asn        | gaa<br>Glu<br>220 | ctg<br>Leu        | caa<br>Gln        | ttg<br>Leu        | gac<br>Asp        | 672  |
| ggc<br>Gly<br>225 | ttc<br>Phe        | cgt<br>Arg        | ctt<br>Leu        | gat<br>Asp        | gct<br>Ala<br>230 | gtc<br>Val        | aaa<br>Lys        | cac<br>His        | att<br>Ile        | aaa<br>Lys<br>235 | ttt<br>Phe        | tct<br>Ser        | ttt<br>Phe        | ttg<br>Leu        | cgg<br>Arg<br>240 | 720  |
| gat<br>Asp        | tg<br>Trp         | gtt<br>Val        | aat<br>Asn        | cat<br>His<br>245 | gtc<br>Val        | agg<br>Arg        | gaa<br>Glu        | aaa<br>Lys        | acg<br>Thr<br>250 | ggg<br>Gly        | aag<br>Lys        | gaa<br>Glu        | atg<br>Met        | ttt<br>Phe<br>255 | acg<br>Thr        | 768  |
| gta<br>Val        | gct<br>Ala        | gaa<br>Glu        | tat<br>Tyr<br>260 | tg<br>Trp         | cag<br>Gln        | aat<br>Asn        | gac<br>Asp        | ttg<br>Leu<br>265 | ggc<br>Gly        | gcg<br>Ala        | ctg<br>Leu        | gaa<br>Glu        | aac<br>Asn<br>270 | tat<br>Tyr        | ttg<br>Leu        | 816  |
| aac<br>Asn        | aaa<br>Lys        | aca<br>Thr<br>275 | aat<br>Asn        | ttt<br>Phe        | aat<br>Asn        | cat<br>His        | tca<br>Ser<br>280 | gtg<br>Val        | ttt<br>Phe        | gac<br>Asp        | gtg<br>Val        | ccg<br>Pro<br>285 | ctt<br>Leu        | cat<br>His        | tat<br>Tyr        | 864  |
| cag<br>Gln        | ttc<br>Phe<br>290 | cat<br>His        | gct<br>Ala        | gca<br>Ala        | tcg<br>Ser        | aca<br>Thr<br>295 | cag<br>Gln        | gga<br>Gly        | ggc<br>Gly        | ggc<br>Gly        | tat<br>Tyr<br>300 | gat<br>Asp        | atg<br>Met        | agg<br>Arg        | aaa<br>Lys        | 912  |
| ttg<br>Leu<br>305 | ctg<br>Leu        | aac<br>Asn        | agt<br>Ser        | acg<br>Thr        | gtc<br>Val<br>310 | gtt<br>Val        | tcc<br>Ser        | aag<br>Lys        | cat<br>His        | ccg<br>Pro<br>315 | ttg<br>Leu        | aaa<br>Lys        | gcg<br>Ala        | gtt<br>Val        | aca<br>Thr<br>320 | 960  |
| ttt<br>Phe        | gtc<br>Val        | gat<br>Asp        | aac<br>Asn        | cat<br>His<br>325 | gat<br>Asp        | aca<br>Thr        | cag<br>Gln        | ccg<br>Pro        | ggg<br>Gly<br>330 | caa<br>Gln        | tcg<br>Ser        | ctt<br>Leu        | gag<br>Glu        | tcg<br>Ser<br>335 | act<br>Thr        | 1008 |
| gtc<br>Val        | caa<br>Gln        | aca<br>Thr        | tg<br>Trp<br>340  | ttt<br>Phe        | aag<br>Lys        | ccg<br>Pro        | ctt<br>Leu        | gct<br>Ala<br>345 | tac<br>Tyr        | gct<br>Ala        | ttt<br>Phe        | att<br>Ile        | ctc<br>Leu<br>350 | aca<br>Thr        | agg<br>Arg        | 1056 |
| gaa<br>Glu        | tct<br>Ser        | gga<br>Gly<br>355 | tac<br>Tyr        | cct<br>Pro        | cag<br>Gln        | gtt<br>Val        | ttc<br>Phe<br>360 | tac<br>Tyr        | ggg<br>Gly        | gat<br>Asp        | atg<br>Met        | tac<br>Tyr<br>365 | ggg<br>Gly        | acg<br>Thr        | aaa<br>Lys        | 1104 |
| gga<br>Gly        | gac<br>Asp<br>370 | tcc<br>Ser        | cag<br>Gln        | cgc<br>Arg        | gaa<br>Glu        | att<br>Ile<br>375 | cct<br>Pro        | gcc<br>Ala        | ttg<br>Leu        | aaa<br>Lys        | cac<br>His<br>380 | aaa<br>Lys        | att<br>Ile        | gaa<br>Glu        | ccg<br>Pro        | 1152 |
| atc<br>Ile<br>385 | tta<br>Leu        | aaa<br>Lys        | gcg<br>Ala        | aga<br>Arg        | aaa<br>Lys<br>390 | cag<br>Gln        | tat<br>Tyr        | gcg<br>Ala        | tac<br>Tyr        | gga<br>Gly<br>395 | gca<br>Ala        | cag<br>Gln        | cat<br>His        | gat<br>Asp        | tat<br>Tyr<br>400 | 1200 |
| ttc<br>Phe        | gac<br>Asp        | cac<br>His        | cat<br>His        | gac<br>Asp<br>405 | att<br>Ile        | gtc<br>Val        | ggc<br>Gly        | tg<br>Trp         | aca<br>Thr<br>410 | agg<br>Arg        | gaa<br>Glu        | ggc<br>Gly        | gac<br>Asp        | agc<br>Ser<br>415 | tcg<br>Ser        | 1248 |

HENK0060.ST25.txt

|   |      |
|---|------|
| gtt gca aat tca ggt ttg gcg gca tta ata aca gac gga ccc ggt ggg | 1296 |
| Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro Gly Gly |      |
| 420 425 430   |      |
| gca aag cga atg tat gtc ggc cgg caa aac gcc ggt gag aca tgg cat | 1344 |
| Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr Trp His |      |
| 435 440 445   |      |
| gac att acc gga aac cgt tcg gag ccg gtt gtc atc aat tcg gaa ggc | 1392 |
| Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser Glu Gly |      |
| 450 455 460   |      |
| tgg gga gag ttt cac gta aac ggc ggg tcg gtt tca att tat gtt caa | 1440 |
| Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr Val Gln |      |
| 465 470 475 480   |      |
| aga tag   | 1446 |
| Arg   |      |

<210> 10  
 <211> 481  
 <212> PRT  
 <213> Artificial

<220>  
 <223> Synthetic Construct

<400> 10

|   |
|---|
| Val Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Thr Pro Asn Asp |
| 1 5 10 15   |
| Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp |
| 20 25 30  |
| Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Leu Ser |
| 35 40 45  |
| Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu |
| 50 55 60  |
| Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Ser Glu |
| 65 70 75 80   |
| Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln Val Tyr |
| 85 90 95  |
| Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr Glu Asp |
| 100 105 110   |
| Val Thr Ala Val Glu Val Asp Pro Ala Asp Arg Asn Arg Val Ile Ser |
| 115 120 125   |
| Gly Glu His Arg Ile Lys Ala Trp Thr His Phe His Phe Pro Gly Arg |
| 130 135 140   |
| Gly Ser Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly |

HENK0060.ST25.txt

|     |     |                   |     |
|-----|-----|-------------------|-----|
|     |     | HENR0000:STZS.txt |     |
| 145 | 150 | 155               | 160 |

Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys Phe Gln  
165 170 175

Gly Lys Ala Trp Asp Trp Glu Val Ser Asn Glu Asn Gly Asn Tyr Asp  
180 185 190

Tyr Leu Met Tyr Ala Asp Ile Asp Tyr Asp His Pro Asp Val Ala Ala  
195 200 205

Glu Ile Lys Arg Trp Gly Thr Trp Tyr Ala Asn Glu Leu Gln Leu Asp  
210 215 220

Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys Phe Ser Phe Leu Arg  
225 230 235 240

Asp Trp Val Asn His Val Arg Glu Lys Thr Gly Lys Glu Met Phe Thr  
245 250 255

Val Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn Tyr Leu  
260 265 270

Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu His Tyr  
275 280 285

Gln Phe His Ala Ala Ser Thr Gln Gly Gly Gly Tyr Asp Met Arg Lys  
290 295 300

Leu Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala Val Thr  
305 310 315 320

Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu Ser Thr  
325 330 335

Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu Thr Arg  
340 345 350

Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly Thr Lys  
355 360 365

Gly Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile Glu Pro  
370 375 380

Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His Asp Tyr  
385 390 395 400

Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp Ser Ser  
405 410 415

Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro Gly Gly  
Page 20

420

HENK0060.ST25.txt

425

430

Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr Trp His  
 435 440 445

Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser Glu Gly  
 450 455 460

Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr Val Gln  
 465 470 475 480

Arg

<210> 11  
 <211> 1452  
 <212> DNA  
 <213> Artificial

<220>  
 <223> Fusion of Alpha-Amylase-Gene von B. licheniformis and B. amyloliquefaciens (AL256)

<220>  
 <221> CDS  
 <222> (1)..(1449)

<400> 11  
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 Val Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Thr Pro Asn Asp  
 1 5 10 15  
 ggc cag cat tgg aaa cga ttg cag aat gat gcg gaa cat tta tcg gat 96  
 Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp  
 20 25 30  
 atc gga atc act gcc gtc tgg att cct ccc gca tac aaa gga ttg agc 144  
 Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Leu Ser  
 35 40 45  
 caa tcc gat aac gga tac gga cct tat gat ttg tat gat tta gga gaa 192  
 Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu  
 50 55 60  
 ttc cag caa aaa ggg acg gtc aga acg aaa tac ggc aca aaa tca gag 240  
 Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Ser Glu  
 65 70 75 80  
 ctt caa gat gcg atc ggc tca ctg cat tcc cgg aac gtc caa gta tac 288  
 Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln Val Tyr  
 85 90 95  
 gga gat gtg gtt ttg aat cat aag gct ggt gct gat gca aca gaa gat 336  
 Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr Glu Asp  
 100 105 110  
 gta act gcc gtc gaa gtc aat ccg gcc aat aga aat cag gaa act tcg 384  
 Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu Thr Ser  
 115 120 125  
 gag gaa tat caa atc aaa gcg tgg acg gat ttt cgt ttt ccg ggc cgt 432  
 Glu Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro Gly Arg  
 Page 21

## HENK0060.ST25.txt

| 130   | 135 | 140 |      |
|---|-----|-----|------|
| gga aac acg tac agt gat ttt aaa tgg cat tgg tat cat ttc gac gga<br>Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly<br>145 150 155 160 |     |     | 480  |
| gcg gac tgg gat gaa tcc cgg aag atc agc cgc atc ttt aag ttt cgt<br>Ala Asp Trp Asp Glu Ser Arg Lys Ile Ser Arg Ile Phe Lys Phe Arg<br>165 170 175     |     |     | 528  |
| ggg gaa gga aaa gcg tgg gat tgg gaa gta tca agt gaa aac ggc aac<br>Gly Glu Gly Lys Ala Trp Asp Trp Glu Val Ser Ser Glu Asn Gly Asn<br>180 185 190     |     |     | 576  |
| tat gac tat tta atg tat gct gat gtt gac tac gac cac cct gat gtc<br>Tyr Asp Tyr Leu Met Tyr Ala Asp Val Asp Tyr Asp His Pro Asp Val<br>195 200 205     |     |     | 624  |
| gtg gca gag aca aaa aaa tgg ggt atc tgg tat gcg aat gaa ctg tca<br>Val Ala Glu Thr Lys Lys Trp Gly Ile Trp Tyr Ala Asn Glu Leu Ser<br>210 215 220     |     |     | 672  |
| tta gac ggc ttc cgt att gat gcc gcc aaa cat att aaa ttt tca ttt<br>Leu Asp Gly Phe Arg Ile Asp Ala Ala Lys His Ile Lys Phe Ser Phe<br>225 230 235 240 |     |     | 720  |
| ctg cgt gat tgg gtt cag gcg gtc aga cag gcg acg gga aaa gaa atg<br>Leu Arg Asp Trp Val Gln Ala Val Arg Gln Ala Thr Gly Lys Glu Met<br>245 250 255     |     |     | 768  |
| ttt acg gta gct gaa tat tgg cag aat gac ttg ggc gcg ctg gaa aac<br>Phe Thr Val Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn<br>260 265 270     |     |     | 816  |
| tat ttg aac aaa aca aat ttt aat cat tca gtg ttt gac gtg ccg ctt<br>Tyr Leu Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu<br>275 280 285     |     |     | 864  |
| cat tat cag ttc cat gct gca tcg aca cag gga ggc ggc tat gat atg<br>His Tyr Gln Phe His Ala Ala Ser Thr Gln Gly Gly Gly Tyr Asp Met<br>290 295 300     |     |     | 912  |
| agg aaa ttg ctg aac agt acg gtc gtt tcc aag cat ccg ttg aaa gcg<br>Arg Lys Leu Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala<br>305 310 315 320 |     |     | 960  |
| gtt aca ttt gtc gat aac cat gat aca cag ccg ggg caa tcg ctt gag<br>Val Thr Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu<br>325 330 335     |     |     | 1008 |
| tcg act gtc caa aca tgg ttt aag ccg ctt gct tac gct ttt att ctc<br>Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu<br>340 345 350     |     |     | 1056 |
| aca agg gaa tct gga tac cct cag gtt ttc tac ggg gat atg tac ggg<br>Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly<br>355 360 365     |     |     | 1104 |
| acg aaa gga gac tcc cag cgc gaa att cct gcc ttg aaa cac aaa att<br>Thr Lys Gly Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile<br>370 375 380     |     |     | 1152 |
| gaa ccg atc tta aaa gcg aga aaa cag tat gcg tac gga gca cag cat<br>Glu Pro Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His<br>385 390 400     |     |     | 1200 |
| gat tat ttc gac cac cat gac att gtc ggc tgg aca agg gaa ggc gac<br>Asp Tyr Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp<br>1248            |     |     |      |

HENK0060.ST25.txt

| 405   | 410 | 415 |      |
|---|-----|-----|------|
| agc tcg gtt gca aat tca ggt ttg gcg gca tta ata aca gac gga ccc |     |     | 1296 |
| Ser Ser Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro | 420 | 430 |      |
| ggt ggg gca aag cga atg tat gtc ggc cgg caa aac gcc ggt gag aca |     |     | 1344 |
| Gly Gly Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr | 440 | 445 |      |
| tgg cat gac att acc gga aac cgt tcg gag ccg gtt gtc atc aat tcg |     |     | 1392 |
| Trp His Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser | 450 | 460 |      |
| gaa ggc tgg gga gag ttt cac gta aac ggc ggg tcg gtt tca att tat |     |     | 1440 |
| Glu Gly Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr | 470 | 475 | 480  |
| ggt caa aga tag   |     |     | 1452 |
| Val Gln Arg   |     |     |      |

<210> 12  
 <211> 483  
 <212> PRT  
 <213> Artificial

<220>  
 <223> Synthetic Construct

<400> 12

|   |     |     |     |    |
|---|-----|-----|-----|----|
| Val Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Thr Pro Asn Asp | 1   | 5   | 10  | 15 |
| Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp | 20  | 25  | 30  |    |
| Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Leu Ser | 35  | 40  | 45  |    |
| Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu | 50  | 55  | 60  |    |
| Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Ser Glu | 65  | 70  | 75  | 80 |
| Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln Val Tyr | 85  | 90  | 95  |    |
| Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr Glu Asp | 100 | 105 | 110 |    |
| Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu Thr Ser | 115 | 120 | 125 |    |
| Glu Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro Gly Arg | 130 | 135 | 140 |    |

HENK0060.ST25.txt

Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly  
 145 150 155 160  
 Ala Asp Trp Asp Glu Ser Arg Lys Ile Ser Arg Ile Phe Lys Phe Arg  
 165 170 175  
 Gly Glu Gly Lys Ala Trp Asp Trp Glu Val Ser Ser Glu Asn Gly Asn  
 180 185 190  
 Tyr Asp Tyr Leu Met Tyr Ala Asp Val Asp Tyr Asp His Pro Asp Val  
 195 200 205  
 Val Ala Glu Thr Lys Lys Trp Gly Ile Trp Tyr Ala Asn Glu Leu Ser  
 210 215 220  
 Leu Asp Gly Phe Arg Ile Asp Ala Ala Lys His Ile Lys Phe Ser Phe  
 225 230 235 240  
 Leu Arg Asp Trp Val Gln Ala Val Arg Gln Ala Thr Gly Lys Glu Met  
 245 250 255  
 Phe Thr Val Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn  
 260 265 270  
 Tyr Leu Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu  
 275 280 285  
 His Tyr Gln Phe His Ala Ala Ser Thr Gln Gly Gly Gly Tyr Asp Met  
 290 295 300  
 Arg Lys Leu Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala  
 305 310 315 320  
 Val Thr Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu  
 325 330 335  
 Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu  
 340 345 350  
 Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly  
 355 360 365  
 Thr Lys Gly Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile  
 370 375 380  
 Glu Pro Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His  
 385 390 395 400  
 Asp Tyr Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp  
 405 410 415



HENK0060.ST25.txt

Ser Ser Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro  
420 425 430

Gly Gly Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr  
435 440 445

Trp His Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser  
450 455 460

Glu Gly Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr  
465 470 475 480

Val Gln Arg

<210> 13  
<211> 1452  
<212> DNA  
<213> Artificial

<220>  
<223> Fusion of Alpha-Amylase-Gene von B. licheniformis and B. amyloliquefaciens (ALA34-84)

<220>  
<221> CDS  
<222> (1)..(1449)

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1 5 10 15  
ggc cag cat tgg aaa cga ttg cag aat gat gcg gaa cat tta tcg gat 96  
Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp  
20 25 30  
atc ggt att act gcc gtc tgg att ccc ccg gca tat aag gga acg agc 144  
Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Thr Ser  
35 40 45  
caa gcg gat gtg ggc tac ggt gct tac gac ctt tat gat tta ggg gag 192  
Gln Ala Asp Val Gly Tyr Gly Ala Tyr Asp Leu Tyr Asp Leu Gly Glu  
50 55 60  
ttt cat caa aaa ggg acg gtt cgg aca aag tac ggc aca aaa gga gag 240  
Phe His Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Gly Glu  
65 70 75 80  
ctg caa tct gcg atc ggc tca ctg cat tcc cgg aac gtc caa gta tac 288  
Leu Gln Ser Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln Val Tyr  
85 90 95  
gga gat gtg gtt ttg aat cat aag gct ggt gct gat gca aca gaa gat 336  
Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr Glu Asp  
100 105 110  
gta act gcc gtc gaa gtc aat ccg gcc aat aga aat cag gaa act tcg 384  
Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu Thr Ser  
115 120 125

HENK0060.ST25.txt

|            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |      |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------|
| gag<br>Glu | gaa<br>Glu | tat<br>Tyr | caa<br>Gln | atc<br>Ile | aaa<br>Lys | gcg<br>Ala | tgg<br>Trp | acg<br>Thr | gat<br>Asp | ttt<br>Phe | cgt<br>Arg | ttt<br>Phe | ccg<br>Pro | ggc<br>Gly | cgt<br>Arg | 432  |
|            | 130        |            |            |            |            | 135        |            |            |            |            | 140        |            |            |            |            |      |
| gga<br>Gly | aac<br>Asn | acg<br>Thr | tac<br>Tyr | agt<br>Ser | gat<br>Asp | ttt<br>Phe | aaa<br>Lys | tgg<br>Trp | cat<br>His | tgg<br>Trp | tat<br>Tyr | cat<br>His | ttc<br>Phe | gac<br>Asp | gga<br>Gly | 480  |
| 145        |            |            |            |            | 150        |            |            |            |            | 155        |            |            |            |            | 160        |      |
| gcg<br>Ala | gac<br>Asp | tgg<br>Trp | gat<br>Asp | gaa<br>Glu | tcc<br>Ser | cgg<br>Arg | aag<br>Lys | atc<br>Ile | agc<br>Ser | cgc<br>Arg | atc<br>Ile | ttt<br>Phe | aag<br>Lys | ttt<br>Phe | cgt<br>Arg | 528  |
|            |            |            |            | 165        |            |            |            |            | 170        |            |            |            |            | 175        |            |      |
| ggg<br>Gly | gaa<br>Glu | gga<br>Gly | aaa<br>Lys | gcg<br>Ala | tgg<br>Trp | gat<br>Asp | tgg<br>Trp | gaa<br>Glu | gta<br>Val | tca<br>Ser | agt<br>Ser | gaa<br>Glu | aac<br>Asn | ggc<br>Gly | aac<br>Asn | 576  |
|            |            |            | 180        |            |            |            |            | 185        |            |            |            |            | 190        |            |            |      |
| tat<br>Tyr | gac<br>Asp | tat<br>Tyr | tta<br>Leu | atg<br>Met | tat<br>Tyr | gct<br>Ala | gat<br>Asp | gtt<br>Val | gac<br>Asp | tac<br>Tyr | gac<br>Asp | cac<br>His | cct<br>Pro | gat<br>Asp | gtc<br>Val | 624  |
|            |            | 195        |            |            |            |            | 200        |            |            |            |            | 205        |            |            |            |      |
| gtg<br>Val | gca<br>Ala | gag<br>Glu | aca<br>Thr | aaa<br>Lys | aaa<br>Lys | tgg<br>Trp | ggt<br>Gly | atc<br>Ile | tgg<br>Trp | tat<br>Tyr | gcg<br>Ala | aat<br>Asn | gaa<br>Glu | ctg<br>Leu | tca<br>Ser | 672  |
|            | 210        |            |            |            |            | 215        |            |            |            |            | 220        |            |            |            |            |      |
| tta<br>Leu | gac<br>Asp | ggc<br>Gly | ttc<br>Phe | cgt<br>Arg | att<br>Ile | gat<br>Asp | gcc<br>Ala | gcc<br>Ala | aaa<br>Lys | cat<br>His | att<br>Ile | aaa<br>Lys | ttt<br>Phe | tca<br>Ser | ttt<br>Phe | 720  |
| 225        |            |            |            |            | 230        |            |            |            |            | 235        |            |            |            |            | 240        |      |
| ctg<br>Leu | cgt<br>Arg | gat<br>Asp | tgg<br>Trp | gtt<br>Val | cag<br>Gln | gcg<br>Ala | gtc<br>Val | aga<br>Arg | cag<br>Gln | gcg<br>Ala | acg<br>Thr | gga<br>Gly | aaa<br>Lys | gaa<br>Glu | atg<br>Met | 768  |
|            |            |            |            | 245        |            |            |            |            | 250        |            |            |            |            | 255        |            |      |
| ttt<br>Phe | acg<br>Thr | gtt<br>Val | gcg<br>Ala | gag<br>Glu | tat<br>Tyr | tgg<br>Trp | cag<br>Gln | aat<br>Asn | aat<br>Asn | gcc<br>Ala | ggg<br>Gly | aaa<br>Lys | ctc<br>Leu | gaa<br>Glu | aac<br>Asn | 816  |
|            |            |            | 260        |            |            |            |            | 265        |            |            |            |            | 270        |            |            |      |
| tac<br>Tyr | ttg<br>Leu | aat<br>Asn | aaa<br>Lys | aca<br>Thr | agc<br>Ser | ttt<br>Phe | aat<br>Asn | caa<br>Gln | tcc<br>Ser | gtg<br>Val | ttt<br>Phe | gat<br>Asp | gtt<br>Val | ccg<br>Pro | ctt<br>Leu | 864  |
|            |            | 275        |            |            |            |            | 280        |            |            |            |            | 285        |            |            |            |      |
| cat<br>His | ttc<br>Phe | aat<br>Asn | tta<br>Leu | cag<br>Gln | gcg<br>Ala | gct<br>Ala | tcc<br>Ser | tca<br>Ser | caa<br>Gln | gga<br>Gly | ggc<br>Gly | gga<br>Gly | tat<br>Tyr | gat<br>Asp | atg<br>Met | 912  |
|            | 290        |            |            |            |            | 295        |            |            |            |            | 300        |            |            |            |            |      |
| agg<br>Arg | cgt<br>Arg | ttg<br>Leu | ctg<br>Leu | gac<br>Asp | ggt<br>Gly | acc<br>Thr | gtt<br>Val | gtg<br>Val | tcc<br>Ser | agg<br>Arg | cat<br>His | ccg<br>Pro | gaa<br>Glu | aag<br>Lys | gcg<br>Ala | 960  |
| 305        |            |            |            |            | 310        |            |            |            |            | 315        |            |            |            |            | 320        |      |
| gtt<br>Val | aca<br>Thr | ttt<br>Phe | gtt<br>Val | gaa<br>Glu | aat<br>Asn | cat<br>His | gac<br>Asp | aca<br>Thr | cag<br>Gln | ccg<br>Pro | gga<br>Gly | cag<br>Gln | tca<br>Ser | ttg<br>Leu | gaa<br>Glu | 1008 |
|            |            |            |            | 325        |            |            |            |            | 330        |            |            |            |            | 335        |            |      |
| tcg<br>Ser | aca<br>Thr | gtc<br>Val | caa<br>Gln | act<br>Thr | tgg<br>Trp | ttt<br>Phe | aaa<br>Lys | ccg<br>Pro | ctt<br>Leu | gca<br>Ala | tac<br>Tyr | gcc<br>Ala | ttt<br>Phe | att<br>Ile | ttg<br>Leu | 1056 |
|            |            |            | 340        |            |            |            |            | 345        |            |            |            |            | 350        |            |            |      |
| aca<br>Thr | aga<br>Arg | gaa<br>Glu | tcc<br>Ser | ggt<br>Gly | tat<br>Tyr | cct<br>Pro | cag<br>Gln | gtg<br>Val | ttc<br>Phe | tat<br>Tyr | ggg<br>Gly | gat<br>Asp | atg<br>Met | tac<br>Tyr | ggg<br>Gly | 1104 |
|            |            | 355        |            |            |            |            | 360        |            |            |            |            | 365        |            |            |            |      |
| aca<br>Thr | aaa<br>Lys | ggg<br>Gly | aca<br>Thr | tcg<br>Ser | cca<br>Pro | aag<br>Lys | gaa<br>Glu | att<br>Ile | ccc<br>Pro | tca<br>Ser | ctg<br>Leu | aaa<br>Lys | gat<br>Asp | aat<br>Asn | ata<br>Ile | 1152 |
|            | 370        |            |            |            |            | 375        |            |            |            |            | 380        |            |            |            |            |      |
| gag<br>Glu | ccg<br>Pro | att<br>Ile | tta<br>Leu | aaa<br>Lys | gcg<br>Ala | cgt<br>Arg | aag<br>Lys | gag<br>Glu | tac<br>Tyr | gca<br>Ala | tac<br>Tyr | ggg<br>Gly | ccc<br>Pro | cag<br>Gln | cac<br>His | 1200 |
| 385        |            |            |            |            | 390        |            |            |            |            | 395        |            |            |            |            | 400        |      |

HENK0060.ST25.txt

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| gat | tat | att | gac | cac | ccg | gat | gtg | atc | gga | tgg | acg | agg | gaa | ggt | gac | 1248 |
| Asp | Tyr | Ile | Asp | His | Pro | Asp | Val | Ile | Gly | Trp | Thr | Arg | Glu | Gly | Asp |      |
|     |     |     | 405 |     |     |     |     |     | 410 |     |     |     |     | 415 |     |      |
| agc | tcc | gcc | gcc | aaa | tca | ggt | ttg | gcc | gct | tta | atc | acg | gac | gga | ccc | 1296 |
| Ser | Ser | Ala | Ala | Lys | Ser | Gly | Leu | Ala | Ala | Leu | Ile | Thr | Asp | Gly | Pro |      |
|     |     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |     |      |
| ggc | gga | tca | aag | cgg | atg | tat | gcc | ggc | ctg | aaa | aat | gcc | ggc | gag | aca | 1344 |
| Gly | Gly | Ser | Lys | Arg | Met | Tyr | Ala | Gly | Leu | Lys | Asn | Ala | Gly | Glu | Thr |      |
|     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |      |
| tgg | tat | gac | ata | acg | ggc | aac | cgt | tca | gat | act | gta | aaa | atc | gga | tct | 1392 |
| Trp | Tyr | Asp | Ile | Thr | Gly | Asn | Arg | Ser | Asp | Thr | Val | Lys | Ile | Gly | Ser |      |
|     | 450 |     |     |     | 455 |     |     |     |     |     | 460 |     |     |     |     |      |
| gac | ggc | tgg | gga | gag | ttt | cat | gta | aac | gat | ggg | tcc | gtc | tcc | att | tat | 1440 |
| Asp | Gly | Trp | Gly | Glu | Phe | His | Val | Asn | Asp | Gly | Ser | Val | Ser | Ile | Tyr |      |
| 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |      |
| ggt | cag | aaa | taa |     |     |     |     |     |     |     |     |     |     |     |     | 1452 |
| Val | Gln | Lys |     |     |     |     |     |     |     |     |     |     |     |     |     |      |

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 <213> Artificial

<220>  
 <223> Synthetic Construct

<400> 14

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Val | Asn | Gly | Thr | Leu | Met | Gln | Tyr | Phe | Glu | Trp | Tyr | Thr | Pro | Asn | Asp |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Gly | Gln | His | Trp | Lys | Arg | Leu | Gln | Asn | Asp | Ala | Glu | His | Leu | Ser | Asp |
|     |     | 20  |     |     |     |     | 25  |     |     |     |     |     | 30  |     |     |
| Ile | Gly | Ile | Thr | Ala | Val | Trp | Ile | Pro | Pro | Ala | Tyr | Lys | Gly | Thr | Ser |
|     | 35  |     |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Gln | Ala | Asp | Val | Gly | Tyr | Gly | Ala | Tyr | Asp | Leu | Tyr | Asp | Leu | Gly | Glu |
|     | 50  |     |     |     |     | 55  |     |     |     | 60  |     |     |     |     |     |
| Phe | His | Gln | Lys | Gly | Thr | Val | Arg | Thr | Lys | Tyr | Gly | Thr | Lys | Gly | Glu |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |
| Leu | Gln | Ser | Ala | Ile | Gly | Ser | Leu | His | Ser | Arg | Asn | Val | Gln | Val | Tyr |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |
| Gly | Asp | Val | Val | Leu | Asn | His | Lys | Ala | Gly | Ala | Asp | Ala | Thr | Glu | Asp |
|     |     | 100 |     |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Val | Thr | Ala | Val | Glu | Val | Asn | Pro | Ala | Asn | Arg | Asn | Gln | Glu | Thr | Ser |
|     | 115 |     |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Glu | Glu | Tyr | Gln | Ile | Lys | Ala | Trp | Thr | Asp | Phe | Arg | Phe | Pro | Gly | Arg |

130

135

140

Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly  
 145 150 155 160

Ala Asp Trp Asp Glu Ser Arg Lys Ile Ser Arg Ile Phe Lys Phe Arg  
 165 170 175

Gly Glu Gly Lys Ala Trp Asp Trp Glu Val Ser Ser Glu Asn Gly Asn  
 180 185 190

Tyr Asp Tyr Leu Met Tyr Ala Asp Val Asp Tyr Asp His Pro Asp Val  
 195 200 205

Val Ala Glu Thr Lys Lys Trp Gly Ile Trp Tyr Ala Asn Glu Leu Ser  
 210 215 220

Leu Asp Gly Phe Arg Ile Asp Ala Ala Lys His Ile Lys Phe Ser Phe  
 225 230 235 240

Leu Arg Asp Trp Val Gln Ala Val Arg Gln Ala Thr Gly Lys Glu Met  
 245 250 255

Phe Thr Val Ala Glu Tyr Trp Gln Asn Asn Ala Gly Lys Leu Glu Asn  
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Tyr Leu Asn Lys Thr Ser Phe Asn Gln Ser Val Phe Asp Val Pro Leu  
 275 280 285

His Phe Asn Leu Gln Ala Ala Ser Ser Gln Gly Gly Gly Tyr Asp Met  
 290 295 300

Arg Arg Leu Leu Asp Gly Thr Val Val Ser Arg His Pro Glu Lys Ala  
 305 310 315 320

Val Thr Phe Val Glu Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu  
 325 330 335

Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu  
 340 345 350

Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly  
 355 360 365

Thr Lys Gly Thr Ser Pro Lys Glu Ile Pro Ser Leu Lys Asp Asn Ile  
 370 375 380

Glu Pro Ile Leu Lys Ala Arg Lys Glu Tyr Ala Tyr Gly Pro Gln His  
 385 390 395 400

Asp Tyr Ile Asp His Pro Asp Val Ile Gly Trp Thr Arg Glu Gly Asp  
 Page 28

405

415

Ser Ser Ala Ala Lys Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro  
420 425 430  
Gly Gly Ser Lys Arg Met Tyr Ala Gly Leu Lys Asn Ala Gly Glu Thr  
435 440 445  
Trp Tyr Asp Ile Thr Gly Asn Arg Ser Asp Thr Val Lys Ile Gly Ser  
450 455 460  
Asp Gly Trp Gly Glu Phe His Val Asn Asp Gly Ser Val Ser Ile Tyr  
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Val Gln Lys

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aat gac ggc cag cat tgg aaa cga ttg cag aat gat gcg gaa cat tta 96  
Asn Asp Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu  
20 25 30  
tcg gat atc gga atc act gcc gtc tgg att cct ccc gca tac aaa gga 144  
Ser Asp Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly  
35 40 45  
ttg agc caa tcc gat aac gga tac gga cct tat gat ttg tat gat tta 192  
Leu Ser Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu  
50 55 60  
gga gaa ttc cag caa aaa ggg acg gtc aga acg aaa tac ggc aca aaa 240  
Gly Glu Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys  
65 70 75 80  
tca gag ctt caa gat gcg atc ggc tca ctg cat tcc cgg aac gtc caa 288  
Ser Glu Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln  
85 90 95  
gta tac gga gat gtg gtt ttg aat cat aag gct ggt gct gat gca aca 336  
Val Tyr Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr  
100 105 110  
gaa gat gta act gcc gtc gaa gtc aat ccg gcc aat aga aat cag gaa 384  
Glu Asp Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu  
Page 29

## HENK0060.ST25.txt

| 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |     |     |      |
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| act | tcg | gag | gaa | tat | caa | atc | aaa | gcg | tgg | acg | gat | ttt | cgt | ttt | ccg | 432  |
| Thr | Ser | Glu | Glu | Tyr | Gln | Ile | Lys | Ala | Trp | Thr | Asp | Phe | Arg | Phe | Pro |      |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |      |
| ggc | cgt | gga | aac | acg | tac | agt | gat | ttt | aaa | tgg | cat | tgg | tat | cat | ttc | 480  |
| Gly | Arg | Gly | Asn | Thr | Tyr | Ser | Asp | Phe | Lys | Trp | His | Trp | Tyr | His | Phe |      |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |      |
| gac | gga | gcg | gac | tgg | gat | gaa | tcc | cgg | aag | atc | agc | cgc | atc | ttt | aag | 528  |
| Asp | Gly | Ala | Asp | Trp | Asp | Glu | Ser | Arg | Lys | Ile | Ser | Arg | Ile | Phe | Lys |      |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |      |
| ttt | cgt | ggg | gaa | gga | aaa | gcg | tgg | gat | tgg | gaa | gta | tca | agt | gaa | aac | 576  |
| Phe | Arg | Gly | Glu | Gly | Lys | Ala | Trp | Asp | Trp | Glu | Val | Ser | Ser | Glu | Asn |      |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |      |
| ggc | aac | tat | gac | tat | tta | atg | tat | gct | gat | ggt | gac | tac | gac | cac | cct | 624  |
| Gly | Asn | Tyr | Asp | Tyr | Leu | Met | Tyr | Ala | Asp | Val | Asp | Tyr | Asp | His | Pro |      |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |      |
| gat | gtc | gtg | gca | gag | aca | aaa | aaa | tgg | ggt | atc | tgg | tat | gcg | aat | gaa | 672  |
| Asp | Val | Val | Ala | Glu | Thr | Lys | Lys | Trp | Gly | Ile | Trp | Tyr | Ala | Asn | Glu |      |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |      |
| ctg | tca | tta | gac | ggc | ttc | cgt | att | gat | gcc | gcc | aaa | cat | att | aaa | ttt | 720  |
| Leu | Ser | Leu | Asp | Gly | Phe | Arg | Ile | Asp | Ala | Ala | Lys | His | Ile | Lys | Phe |      |
| 225 |     |     |     |     | 230 |     |     |     | 235 |     |     |     |     |     | 240 |      |
| tca | ttt | ctg | cgt | gat | tgg | gtt | cag | gcg | gtc | aga | cag | gcg | acg | gga | aaa | 768  |
| Ser | Phe | Leu | Arg | Asp | Trp | Val | Gln | Ala | Val | Arg | Gln | Ala | Thr | Gly | Lys |      |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |      |
| gaa | atg | ttt | acg | gtt | gcg | gag | tat | tgg | cag | aat | aat | gcc | ggg | aaa | ctc | 816  |
| Glu | Met | Phe | Thr | Val | Ala | Glu | Tyr | Trp | Gln | Asn | Asn | Ala | Gly | Lys | Leu |      |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |      |
| gaa | aac | tac | ttg | aat | aaa | aca | agc | ttt | aat | caa | tcc | gtg | ttt | gat | gtt | 864  |
| Glu | Asn | Tyr | Leu | Asn | Lys | Thr | Ser | Phe | Asn | Gln | Ser | Val | Phe | Asp | Val |      |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |      |
| ccg | ctt | cat | ttc | aat | tta | cag | gcg | gct | tcc | tca | caa | gga | ggc | gga | tat | 912  |
| Pro | Leu | His | Phe | Asn | Leu | Gln | Ala | Ala | Ser | Ser | Gln | Gly | Gly | Gly | Tyr |      |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |      |
| gat | atg | agg | cgt | ttg | ctg | gac | ggt | acc | gtt | gtg | tcc | agg | cat | ccg | gaa | 960  |
| Asp | Met | Arg | Arg | Leu | Leu | Asp | Gly | Thr | Val | Val | Ser | Arg | His | Pro | Glu |      |
| 305 |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     |     | 320 |      |
| aag | gcg | gtt | aca | ttt | gtt | gaa | aat | cat | gac | aca | cag | ccg | gga | cag | tca | 1008 |
| Lys | Ala | Val | Thr | Phe | Val | Glu | Asn | His | Asp | Thr | Gln | Pro | Gly | Gln | Ser |      |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     | 335 |     |     |      |
| ttg | gaa | tcg | aca | gtc | caa | act | tgg | ttt | aaa | ccg | ctt | gca | tac | gcc | ttt | 1056 |
| Leu | Glu | Ser | Thr | Val | Gln | Thr | Trp | Phe | Lys | Pro | Leu | Ala | Tyr | Ala | Phe |      |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |      |
| att | ttg | aca | aga | gaa | tcc | ggt | tat | cct | cag | gtg | ttc | tat | ggg | gat | atg | 1104 |
| Ile | Leu | Thr | Arg | Glu | Ser | Gly | Tyr | Pro | Gln | Val | Phe | Tyr | Gly | Asp | Met |      |
|     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |      |
| tac | ggg | aca | aaa | ggg | aca | tcg | cca | aag | gaa | att | ccc | tca | ctg | aaa | gat | 1152 |
| Tyr | Gly | Thr | Lys | Gly | Thr | Ser | Pro | Lys | Glu | Ile | Pro | Ser | Leu | Lys | Asp |      |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |      |
| aat | ata | gag | ccg | att | tta | aaa | gcg | cgt | aag | gag | tac | gca | tac | ggg | ccc | 1200 |
| Asn | Ile | Glu | Pro | Ile | Leu | Lys | Ala | Arg | Lys | Glu | Tyr | Ala | Tyr | Gly | Pro |      |

HENK0060.ST25.txt

| 385 |     | 390 |     | 395 |     | 400 |     |     |     |     |     |     |     |     |     |      |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| cag | cac | gat | tat | att | gac | cac | ccg | gat | gtg | atc | gga | tgg | acg | agg | gaa | 1248 |
| Gln | His | Asp | Tyr | Ile | Asp | His | Pro | Asp | Val | Ile | Gly | Trp | Thr | Arg | Glu |      |
|     |     |     |     | 405 |     |     |     |     | 410 |     |     |     |     | 415 |     |      |
| ggt | gac | agc | tcc | gcc | gcc | aaa | tca | ggt | ttg | gcc | gct | tta | atc | acg | gac | 1296 |
| Gly | Asp | Ser | Ser | Ala | Ala | Lys | Ser | Gly | Leu | Ala | Ala | Leu | Ile | Thr | Asp |      |
|     |     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |     |      |
| gga | ccc | ggt | ggg | gca | aag | cga | atg | tat | gtc | ggc | cgg | caa | aac | gcc | ggt | 1344 |
| Gly | Pro | Gly | Gly | Ala | Lys | Arg | Met | Tyr | Val | Gly | Arg | Gln | Asn | Ala | Gly |      |
|     |     |     | 435 |     |     |     | 440 |     |     |     |     | 445 |     |     |     |      |
| gag | aca | tgg | cat | gac | att | acc | gga | aac | cgt | tcg | gag | ccg | gtt | gtc | atc | 1392 |
| Glu | Thr | Trp | His | Asp | Ile | Thr | Gly | Asn | Arg | Ser | Glu | Pro | Val | Val | Ile |      |
|     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |      |
| aat | tcg | gaa | ggc | tgg | gga | gag | ttt | cac | gta | aac | ggc | ggg | tcg | gtt | tca | 1440 |
| Asn | Ser | Glu | Gly | Trp | Gly | Glu | Phe | His | Val | Asn | Gly | Gly | Ser | Val | Ser |      |
| 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |      |
| att | tat | gtt | caa | aga | tag |     |     |     |     |     |     |     |     |     |     | 1458 |
| Ile | Tyr | Val | Gln | Arg |     |     |     |     |     |     |     |     |     |     |     |      |
|     |     |     |     | 485 |     |     |     |     |     |     |     |     |     |     |     |      |

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 <212> PRT  
 <213> Artificial

<220>  
 <223> Synthetic Construct

<400> 16

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ala | Asn | Leu | Asn | Gly | Thr | Leu | Met | Gln | Tyr | Phe | Glu | Trp | Tyr | Met | Pro |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Asn | Asp | Gly | Gln | His | Trp | Lys | Arg | Leu | Gln | Asn | Asp | Ala | Glu | His | Leu |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Ser | Asp | Ile | Gly | Ile | Thr | Ala | Val | Trp | Ile | Pro | Pro | Ala | Tyr | Lys | Gly |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Leu | Ser | Gln | Ser | Asp | Asn | Gly | Tyr | Gly | Pro | Tyr | Asp | Leu | Tyr | Asp | Leu |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Gly | Glu | Phe | Gln | Gln | Lys | Gly | Thr | Val | Arg | Thr | Lys | Tyr | Gly | Thr | Lys |
| 65  |     |     |     |     | 70  |     |     |     | 75  |     |     |     |     |     | 80  |
| Ser | Glu | Leu | Gln | Asp | Ala | Ile | Gly | Ser | Leu | His | Ser | Arg | Asn | Val | Gln |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |
| Val | Tyr | Gly | Asp | Val | Val | Leu | Asn | His | Lys | Ala | Gly | Ala | Asp | Ala | Thr |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Glu | Asp | Val | Thr | Ala | Val | Glu | Val | Asn | Pro | Ala | Asn | Arg | Asn | Gln | Glu |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |

HENK0060.ST25.txt

Thr Ser Glu Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro  
 130 135 140  
 Gly Arg Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe  
 145 150 155 160  
 Asp Gly Ala Asp Trp Asp Glu Ser Arg Lys Ile Ser Arg Ile Phe Lys  
 165 170 175  
 Phe Arg Gly Glu Gly Lys Ala Trp Asp Trp Glu Val Ser Ser Glu Asn  
 180 185 190  
 Gly Asn Tyr Asp Tyr Leu Met Tyr Ala Asp Val Asp Tyr Asp His Pro  
 195 200 205  
 Asp Val Val Ala Glu Thr Lys Lys Trp Gly Ile Trp Tyr Ala Asn Glu  
 210 215 220  
 Leu Ser Leu Asp Gly Phe Arg Ile Asp Ala Ala Lys His Ile Lys Phe  
 225 230 235 240  
 Ser Phe Leu Arg Asp Trp Val Gln Ala Val Arg Gln Ala Thr Gly Lys  
 245 250 255  
 Glu Met Phe Thr Val Ala Glu Tyr Trp Gln Asn Asn Ala Gly Lys Leu  
 260 265 270  
 Glu Asn Tyr Leu Asn Lys Thr Ser Phe Asn Gln Ser Val Phe Asp Val  
 275 280 285  
 Pro Leu His Phe Asn Leu Gln Ala Ala Ser Ser Gln Gly Gly Gly Tyr  
 290 295 300  
 Asp Met Arg Arg Leu Leu Asp Gly Thr Val Val Ser Arg His Pro Glu  
 305 310 315 320  
 Lys Ala Val Thr Phe Val Glu Asn His Asp Thr Gln Pro Gly Gln Ser  
 325 330 335  
 Leu Glu Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe  
 340 345 350  
 Ile Leu Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met  
 355 360 365  
 Tyr Gly Thr Lys Gly Thr Ser Pro Lys Glu Ile Pro Ser Leu Lys Asp  
 370 375 380  
 Asn Ile Glu Pro Ile Leu Lys Ala Arg Lys Glu Tyr Ala Tyr Gly Pro  
 385 390 395 400



HENK0060.ST25.txt

Gln His Asp Tyr Ile Asp His Pro Asp Val Ile Gly Trp Thr Arg Glu  
405 410 415

Gly Asp Ser Ser Ala Ala Lys Ser Gly Leu Ala Ala Leu Ile Thr Asp  
420 425 430

Gly Pro Gly Gly Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly  
435 440 445

Glu Thr Trp His Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile  
450 455 460

Asn Ser Glu Gly Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser  
465 470 475 480

Ile Tyr Val Gln Arg  
485

<210> 17  
<211> 1452  
<212> DNA  
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<220>  
<223> Fusion of Alpha-Amylase-Gene von B. licheniformis and B. amyloliquefaciens (LAL19-153)

<220>  
<221> CDS  
<222> (1)..(1449)

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Ala Asn Leu Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Met Pro  
1 5 10 15

aat gac ggc cag cat tgg aaa cga ttg cag aat gat gcg gaa cat tta 96  
Asn Asp Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu  
20 25 30

tcg gat atc gga atc act gcc gtc tgg att cct ccc gca tac aaa gga 144  
Ser Asp Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly  
35 40 45

ttg agc caa tcc gat aac gga tac gga cct tat gat ttg tat gat tta 192  
Leu Ser Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu  
50 55 60

gga gaa ttc cag caa aaa ggg acg gtc aga acg aaa tac ggc aca aaa 240  
Gly Glu Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys  
65 70 75 80

tca gag ctt caa gat gcg atc ggc tca ctg cat tcc cgg aac gtc caa 288  
Ser Glu Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln  
85 90 95

gta tac gga gat gtg gtt ttg aat cat aag gct ggt gct gat gca aca 336  
Val Tyr Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr  
100 105 110

HENK0060.ST25.txt

|   |                                 |     |
|---|---------------------------------|-----|
| gaa gat gta act gcc gtc gaa gtc                                 | aat ccg gcc aat aga aat cag gaa | 384 |
| Glu Asp Val Thr Ala Val Glu Val                                 | Asn Pro Ala Asn Arg Asn Gln Glu |     |
| 115   | 120 125                         |     |
| act tcg gag gaa tat caa atc aaa gcg tgg acg gat ttt cgt ttt ccg | 432                             |     |
| Thr Ser Glu Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro |                                 |     |
| 130   | 135 140                         |     |
| ggc cgt gga aac acg tac agt gat ttt aaa tgg cat tgg tac cat ttt | 480                             |     |
| Gly Arg Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe |                                 |     |
| 145   | 150 155 160                     |     |
| gac gga acc gat tgg gac gag tcc cga aag ctg aac cgc atc tat aag | 528                             |     |
| Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys |                                 |     |
| 165   | 170 175                         |     |
| ttt caa gga aag gct tgg gat tgg gaa gtt tcc aat gaa aac ggc aac | 576                             |     |
| Phe Gln Gly Lys Ala Trp Asp Trp Glu Val Ser Asn Glu Asn Gly Asn |                                 |     |
| 180   | 185 190                         |     |
| tat gat tat ttg atg tat gcc gac atc gat tat gac cat cct gat gtc | 624                             |     |
| Tyr Asp Tyr Leu Met Tyr Ala Asp Ile Asp Tyr Asp His Pro Asp Val |                                 |     |
| 195   | 200 205                         |     |
| gca gca gaa att aag aga tgg ggc act tgg tat gcc aat gaa ctg caa | 672                             |     |
| Ala Ala Glu Ile Lys Arg Trp Gly Thr Trp Tyr Ala Asn Glu Leu Gln |                                 |     |
| 210   | 215 220                         |     |
| ttg gac ggt ttc cgt ctt gat gct gtc aaa cac att aaa ttt tct ttt | 720                             |     |
| Leu Asp Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys Phe Ser Phe |                                 |     |
| 225   | 230 235 240                     |     |
| ttg cgg gat tgg gtt aat cat gtc agg gaa aaa acg ggg aag gaa atg | 768                             |     |
| Leu Arg Asp Trp Val Asn His Val Arg Glu Lys Thr Gly Lys Glu Met |                                 |     |
| 245   | 250 255                         |     |
| ttt acg gta gct gaa tat tgg cag aat gac ttg ggc gcg ctg gaa aac | 816                             |     |
| Phe Thr Val Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Asn     |                                 |     |
| 260   | 265 270                         |     |
| tat ttg aac aaa aca aat ttt aat cat tca gtg ttt gac gtg ccg ctt | 864                             |     |
| Tyr Leu Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu |                                 |     |
| 275   | 280 285                         |     |
| cat tat cag ttc cat gct gca tcg aca cag gga ggc ggc tat gat atg | 912                             |     |
| His Tyr Gln Phe His Ala Ala Ser Thr Gln Gly Gly Gly Tyr Asp Met |                                 |     |
| 290   | 295 300                         |     |
| agg aaa ttg ctg aac agt acg gtc gtt tcc aag cat ccg ttg aaa gcg | 960                             |     |
| Arg Lys Leu Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala |                                 |     |
| 305   | 310 315 320                     |     |
| gtt aca ttt gtc gat aac cat gat aca cag ccg ggg caa tcg ctt gag | 1008                            |     |
| Val Thr Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu |                                 |     |
| 325   | 330 335                         |     |
| tcg act gtc caa aca tgg ttt aag ccg ctt gct tac gct ttt att ctc | 1056                            |     |
| Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu |                                 |     |
| 340   | 345 350                         |     |
| aca agg gaa tct gga tac cct cag gtt ttc tac ggg gat atg tac ggg | 1104                            |     |
| Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly |                                 |     |
| 355   | 360 365                         |     |
| acg aaa gga gac tcc cag cgc gaa att cct gcc ttg aaa cac aaa att | 1152                            |     |
| Thr Lys Gly Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile |                                 |     |
| 370   | 375 380                         |     |

HENK0060.ST25.txt

|   |      |
|---|------|
| gaa ccg atc tta aaa gcg aga aaa cag tat gcg tac gga gca cag cat | 1200 |
| Glu Pro Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His |      |
| 385 390 395 400   |      |
| gat tat ttc gac cac cat gac att gtc ggc tgg aca agg gaa ggc gac | 1248 |
| Asp Tyr Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp |      |
| 405 410 415   |      |
| agc tcg gtt gca aat tca ggt ttg gcg gca tta ata aca gac gga ccc | 1296 |
| Ser Ser Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro |      |
| 420 425 430   |      |
| ggt ggg gca aag cga atg tat gtc ggc cgg caa aac gcc ggt gag aca | 1344 |
| Gly Gly Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr |      |
| 435 440 445   |      |
| tgg cat gac att acc gga aac cgt tcg gag ccg gtt gtc atc aat tcg | 1392 |
| Trp His Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser |      |
| 450 455 460   |      |
| gaa ggc tgg gga gag ttt cac gta aac ggc ggg tcg gtt tca att tat | 1440 |
| Glu Gly Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr |      |
| 465 470 475 480   |      |
| ggt caa aga tag   | 1452 |
| Val Gln Arg   |      |

<210> 18  
 <211> 483  
 <212> PRT  
 <213> Artificial

<220>  
 <223> Synthetic Construct

<400> 18

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|---|--|
| Ala Asn Leu Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Met Pro |  |
| 1 5 10 15   |  |
| Asn Asp Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu |  |
| 20 25 30  |  |
| Ser Asp Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly |  |
| 35 40 45  |  |
| Leu Ser Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu |  |
| 50 55 60  |  |
| Gly Glu Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys |  |
| 65 70 75 80   |  |
| Ser Glu Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln |  |
| 85 90 95  |  |
| Val Tyr Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr |  |
| 100 105 110   |  |
| Glu Asp Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu |  |

115

120

125

Thr Ser Glu Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro  
 130 135 140

Gly Arg Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe  
 145 150 155 160

Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys  
 165 170 175

Phe Gln Gly Lys Ala Trp Asp Trp Glu Val Ser Asn Glu Asn Gly Asn  
 180 185 190

Tyr Asp Tyr Leu Met Tyr Ala Asp Ile Asp Tyr Asp His Pro Asp Val  
 195 200 205

Ala Ala Glu Ile Lys Arg Trp Gly Thr Trp Tyr Ala Asn Glu Leu Gln  
 210 215 220

Leu Asp Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys Phe Ser Phe  
 225 230 235 240

Leu Arg Asp Trp Val Asn His Val Arg Glu Lys Thr Gly Lys Glu Met  
 245 250 255

Phe Thr Val Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn  
 260 265 270

Tyr Leu Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu  
 275 280 285

His Tyr Gln Phe His Ala Ala Ser Thr Gln Gly Gly Gly Tyr Asp Met  
 290 295 300

Arg Lys Leu Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala  
 305 310 315 320

Val Thr Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu  
 325 330 335

Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu  
 340 345 350

Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly  
 355 360 365

Thr Lys Gly Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile  
 370 375 380

Glu Pro Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His  
 Page 36

385 390 395 400

Asp Tyr Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp  
405 410 415

Ser Ser Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro  
420 425 430

Gly Gly Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr  
435 440 445

Trp His Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser  
450 455 460

Glu Gly Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr  
465 470 475 480

Val Gln Arg

<210> 19  
<211> 512  
<212> PRT  
<213> Bacillus licheniformis

<400> 19

Met Lys Gln Gln Lys Arg Leu Tyr Ala Arg Leu Leu Thr Leu Leu Phe  
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Ala Leu Ile Phe Leu Leu Pro His Ser Ala Ala Ala Ala Ala Asn Leu  
20 25 30

Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Met Pro Asn Asp Gly  
35 40 45

Gln His Trp Lys Arg Leu Gln Asn Asp Ser Ala Tyr Leu Ala Glu His  
50 55 60

Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Thr Ser Gln  
65 70 75 80

Ala Asp Val Gly Tyr Gly Ala Tyr Asp Leu Tyr Asp Leu Gly Glu Phe  
85 90 95

His Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Gly Glu Leu  
100 105 110

Gln Ser Ala Ile Lys Ser Leu His Ser Arg Asp Ile Asn Val Tyr Gly  
115 120 125

Asp Val Val Ile Asn His Lys Gly Gly Ala Asp Ala Thr Glu Asp Val  
130 135 140

HENK0060.ST25.txt

Thr Ala Val Glu Val Asp Pro Ala Asp Arg Asn Arg Val Ile Ser Gly  
 145 150 155 160  
 Glu His Arg Ile Lys Ala Trp Thr His Phe His Phe Pro Gly Arg Gly  
 165 170 175  
 Ser Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly Thr  
 180 185 190  
 Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys Phe Gln Gly  
 195 200 205  
 Lys Ala Trp Asp Trp Glu Val Ser Asn Glu Asn Gly Asn Tyr Asp Tyr  
 210 215 220  
 Leu Met Tyr Ala Asp Ile Asp Tyr Asp His Pro Asp Val Ala Ala Glu  
 225 230 235 240  
 Ile Lys Arg Trp Gly Thr Trp Tyr Ala Asn Glu Leu Gln Leu Asp Gly  
 245 250 255  
 Phe Arg Leu Asp Ala Val Lys His Ile Lys Phe Ser Phe Leu Arg Asp  
 260 265 270  
 Trp Val Asn His Val Arg Glu Lys Thr Gly Lys Glu Met Phe Thr Val  
 275 280 285  
 Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn Tyr Leu Asn  
 290 295 300  
 Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu His Tyr Gln  
 305 310 315 320  
 Phe His Ala Ala Ser Thr Gln Gly Gly Gly Tyr Asp Met Arg Lys Leu  
 325 330 335  
 Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala Val Thr Phe  
 340 345 350  
 Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu Ser Thr Val  
 355 360 365  
 Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu Thr Arg Glu  
 370 375 380  
 Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly Thr Lys Gly  
 385 390 395 400  
 Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile Glu Pro Ile  
 405 410 415

Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His Asp Tyr Phe  
420 425 430

Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp Ser Ser Val  
435 440 445

Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro Gly Gly Ala  
450 455 460

Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr Trp His Asp  
465 470 475 480

Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser Glu Gly Trp  
485 490 495

Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr Val Gln Arg  
500 505 510

<210> 20  
<211> 514  
<212> PRT  
<213> Bacillus amyloliquefaciens

<400> 20

Met Ile Gln Lys Arg Lys Arg Thr Val Ser Phe Arg Leu Val Leu Met  
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Cys Thr Leu Leu Phe Val Ser Leu Pro Ile Thr Lys Thr Ser Ala Val  
20 25 30

Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Thr Pro Asn Asp Gly  
35 40 45

Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp Ile  
50 55 60

Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Leu Ser Gln  
65 70 75 80

Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu Phe  
85 90 95

Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Ser Glu Leu  
100 105 110

Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln Val Tyr Gly  
115 120 125

Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr Glu Asp Val  
130 135 140

HENK0060.ST25.txt

Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu Thr Ser Glu  
 145 150 155 160  
 Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro Gly Arg Gly  
 165 170 175  
 Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly Ala  
 180 185 190  
 Asp Trp Asp Glu Ser Arg Lys Ile Ser Arg Ile Phe Lys Phe Arg Gly  
 195 200 205  
 Glu Gly Lys Ala Trp Asp Trp Glu Val Ser Ser Glu Asn Gly Asn Tyr  
 210 215 220  
 Asp Tyr Leu Met Tyr Ala Asp Val Asp Tyr Asp His Pro Asp Val Val  
 225 230 235 240  
 Ala Glu Thr Lys Lys Trp Gly Ile Trp Tyr Ala Asn Glu Leu Ser Leu  
 245 250 255  
 Asp Gly Phe Arg Ile Asp Ala Ala Lys His Ile Lys Phe Ser Phe Leu  
 260 265 270  
 Arg Asp Trp Val Gln Ala Val Arg Gln Ala Thr Gly Lys Glu Met Phe  
 275 280 285  
 Thr Val Ala Glu Tyr Trp Gln Asn Asn Ala Gly Lys Leu Glu Asn Tyr  
 290 295 300  
 Leu Asn Lys Thr Ser Phe Asn Gln Ser Val Phe Asp Val Pro Leu His  
 305 310 315 320  
 Phe Asn Leu Gln Ala Ala Ser Ser Gln Gly Gly Gly Tyr Asp Met Arg  
 325 330 335  
 Arg Leu Leu Asp Gly Thr Val Val Ser Arg His Pro Glu Lys Ala Val  
 340 345 350  
 Thr Phe Val Glu Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu Ser  
 355 360 365  
 Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu Thr  
 370 375 380  
 Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly Thr  
 385 390 395 400  
 Lys Gly Thr Ser Pro Lys Glu Ile Pro Ser Leu Lys Asp Asn Ile Glu  
 405 410 415



HENK0060.ST25.txt

Pro Ile Leu Lys Ala Arg Lys Glu Tyr Ala Tyr Gly Pro Gln His Asp  
 420 425 430

Tyr Ile Asp His Pro Asp Val Ile Gly Trp Thr Arg Glu Gly Asp Ser  
 435 440 445

Ser Ala Ala Lys Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro Gly  
 450 455 460

Gly Ser Lys Arg Met Tyr Ala Gly Leu Lys Asn Ala Gly Glu Thr Trp  
 465 470 475 480

Tyr Asp Ile Thr Gly Asn Arg Ser Asp Thr Val Lys Ile Gly Ser Asp  
 485 490 495

Gly Trp Gly Glu Phe His Val Asn Asp Gly Ser Val Ser Ile Tyr Val  
 500 505 510

Gln Lys